

# **Naknek Crossing Intermodal Economic and Airport Use Study**

*Prepared for the*

**Alaska Department of Transportation and Public Facilities**



**May 2005**

*Prepared by*



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The Boutet Company**



*The Office of*  
**Governor Frank H. Murkowski**

Dear Alaskan:

It is a great pleasure to welcome you as a reader of this report, which discusses the proposed Naknek Crossing and how such a road and bridge project would affect the airports and economies of King Salmon, Naknek, and South Naknek.

The situation at Naknek epitomizes all too well the problem we grapple with in many communities throughout rural Alaska—villages in close proximity continue to be stand-alone communities. They each require schools, clinics, airports, tank farms, and all the other parts and pieces of a community. Travel between them is by air, boat, or snowmachine. The potential solution—connecting them with a road—is one that would apply elsewhere, as well. It is a solution my administration advocates.

In the attached document, you will read of the many benefits that could ensue from connecting these three communities by road and a bridge across the Naknek River, as described by the residents:

- Reduced cost of travel between communities
- Consolidation of some community services, and a corresponding reduced cost of those services
- Improved safety for travelers
- Improved emergency services and better access to health care
- Better schools and educational opportunities for the children of the communities
- The opportunity to generate economic activity throughout the borough

This proposal is the essence of my administration's mission as the main provider of a transportation system for Alaska's residents. I appreciate the extra effort put forth by all the individuals who prepared this report, and thank the Federal Aviation Administration and Federal Highway Administration for their cooperation in co-funding the report. I believe getting to the right solution for the residents of King Salmon, Naknek, and South Naknek will also be the right solution for the federal funding agencies, and for the Alaska Department of Transportation and Public Facilities.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Frank H. Murkowski".

Frank H. Murkowski  
Governor



# STATE OF ALASKA

## DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES OFFICE OF THE COMMISSIONER

FRANK H. MURKOWSKI, GOVERNOR

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April 25, 2005

Dear Alaskan:

Every now and then there comes an opportunity to make a transportation decision that results in a tremendous difference in the lives of Alaskans. This study is the result of one such opportunity.

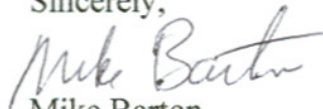
In this case, the department was faced with the choice of spending a significant amount of money to improve airports in the communities of King Salmon, Naknek, and South Naknek, or consider an alternative that had been talked about for a long time – bridging the Naknek River and establishing a physical connection between Bristol Bay Borough communities. Either option involved the investment of millions of dollars – the important question was which of the two would best serve Borough residents and the State of Alaska.

I am happy to report that the *Naknek Crossing Intermodal Economic and Airport Use Study* demonstrates a compelling state interest in moving forward with a bridge project and consolidation of airport facilities. It does so with effective public involvement and sound economic analysis.

The *Naknek Crossing Intermodal Economic and Airport Use Study* was recommended in the Southwest Alaska Transportation Plan (Revised edition, 2004) in order to better identify the range of public services affected and the overall savings such a project would produce for the State and the Borough. It draws its authority from Alaska Statute 44.42.050 and is a component of the Alaska Statewide Transportation Plan as defined in 23 CFR 450.214. In accordance with 17AAC 05.150, I do hereby approve and adopt the *Naknek Crossing Intermodal Economic and Airport Use Study* as a component of the Alaska Statewide Transportation Plan.

I look forward to seeing this project move towards construction in the years ahead. I am confident that it lays the groundwork for a new and improved transportation system that will bring multiple benefits to the people of the Bristol Bay region and to all Alaskans.

Sincerely,



Mike Barton  
Commissioner



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## **Abbreviations**

AADT	average annual daily traffic
ADOT&PF	Alaska Department of Transportation and Public Facilities
AHS	Alaska Highway System
AMHS	Alaska Marine Highway System
FHWA	Federal Highway Administration
M&O	Maintenance and operations
NMFS	National Marine Fisheries Service
SHS	Secondary Highway System
SPSS	Statistical Package for the Social Sciences
STIP	State Transportation Improvement Plan
TRAAK	Trails and Recreational Access for Alaska
USFWS	United States Fish and Wildlife Service
VFR	Visual Flight Rules



## Executive summary

The Southwest Alaska Transportation Plan of 2002 recommended a study of a potential surface link spanning the Naknek River to define the appropriate level of transportation investment, and to examine the distribution of costs and benefits among various interests.

This project incorporates a combination of airport and roadway planning analysis to determine the impact of a road link and bridge across the Naknek River on air traffic and aviation facility use. Unlike prior studies that focused only on airport or road construction, this study quantifies costs and benefits using a system-wide analysis, comparing the future costs and benefits of a highway crossing with various airport options, to those of airport improvements only.

The Alaska Department of Transportation and Public Facilities (ADOT&PF) is interested in a bridge project as part of its long-term goal of seeking greater efficiencies and providing better transportation services. Connecting the three Bristol Bay Borough communities by road would address this goal by providing better transportation services between the communities and potentially reducing costs by eliminating departmental ownership and operational costs of airports that have only a general aviation component.

During a series of public meetings in the Borough, local residents described several benefits that a bridge and road would provide. These benefits included:

- Improved safety for persons traveling between the communities
- Reduction of the cost of travel between the communities
- Improved educational and social benefits for school-age children
- Improved access to hospitals and clinics for residents of South Naknek
- Improved response time for emergency services and public safety
- Creation of additional economic activity in the Bristol Bay Borough
- Opportunity for consolidation of services and facilities and reduced costs for the Borough, state agencies, and other organizations

The changes under consideration include construction of a bridge as well as closures or improvements to the airports in the Borough. The changes have been categorized into two scenarios (*Aviation Only Improvements* and *Bridge and Aviation Improvements*), with several options for each scenario. The various scenario/option combinations are:

### **Scenario A. Aviation Only Improvements**

Option A1. Keep all three airports open

Option A2. Close Naknek airport

### **Scenario B. Bridge and Aviation Improvements**

Option B1. Keep all three airports open

Option B2. Close Naknek airport

Option B3. Close South Naknek airport

Option B4. Close Naknek and South Naknek airports

Option B5. Bristol Bay Borough operates Naknek and South Naknek airports

Option B6. Close Naknek airport and Borough operates South Naknek airport

If an aviation only scenario is selected, then the planned improvements for the three airports are anticipated to be implemented over a 20-year period that starts when a decision is made on which option to develop. If a bridge scenario is selected, it may take six to eight years to move through the environmental review process and permitting, as well as obtaining the funding for the bridge and the road. For purposes of this report bridge construction is assumed to begin in 2012 with the bridge opening in 2014. Under options calling for closure of the Naknek airport, it would close in approximately 3-5 years under an aviation only scenario, or remain in operation until the bridge is open. For options that include closure of the South Naknek airport, it is anticipated that the airport would remain open until 2017 when grant assurance to the Federal Aviation Administration (FAA) would end.

Table ES-1 compares the annual operating and capital costs associated with A1 to each of the other scenario/options. In all cases, the estimates incorporate the approximately \$737,000 in annual operations and maintenance costs, and \$41 million to \$43 million in planned capital expenditures at the King Salmon airport over the next 20 years.<sup>1</sup> Planned capital improvements at Naknek airport are estimated at about \$22 million over that time period, and South Naknek airport improvements are estimated at \$4 million to \$6 million, depending on the option. The bridge scenario is at a conceptual level of design, and for the purposes of this study the bridge is assumed to span the Naknek River near Fishery Point. Capital costs range from \$26 million to \$40 million for a 2,300-foot steel girder structure. Maintenance costs for the bridge and the 14,500-foot road are estimated at about \$45 thousand annually. Scenario/option A2 has the lowest capital and operating costs for ADOT&PF while B1 has the highest annual operating costs and is tied with B5 for the highest capital costs. However, when the effect of the bridge on annual operating costs of other entities is considered, options B2 and B6 achieve the greatest reduction in total operating costs. Additional comparison information is presented in “How do the Scenarios/options compare?”

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<sup>1</sup> The capital improvements change slightly with the scenario/option that may be selected.

**Table ES-1. Comparison of scenario/option annual operating and capital costs**

Scenario/Option	Annual Operating Costs (Thousands of 2003\$)					Capital Costs (Millions of 2003\$)	
	Borough	School	Other	ADOT&PF	Total	Low	High
		District	Organizations				
A1	0	0	0	0	0	0	0
A2	0	0	0	-30	-30	-19	-19
B1	-100	-300	-76	45	-431	26	40
B2	-100	-300	-76	17	-459	7	21
B3	-100	-300	-76	25	-451	22	35
B4	-100	-300	-76	-5	-481	3	16
B5	-50	-300	-76	-5	-431	26	40
B6	-78	-300	-76	-5	-459	7	21

Note: Capital costs are presented in millions in this table to reflect the level of uncertainty associated with them. Capital costs for the airport improvements were taken from previous studies and updated to 2003 levels based on a national construction inflation index, which may not reflect actual construction cost changes in Alaska, and bridge costs are based on a conceptual level design.

In fiscal year 2003, the ADOT&PF spent approximately \$737 thousand for operations and maintenance at the King Salmon airport, about \$30 thousand at the Naknek airport, and roughly \$20 thousand at South Naknek, for an approximate total of \$787 thousand.

Estimates of traffic volumes across the bridge were calculated by identifying pairs of communities that have attributes similar to the Bristol Bay communities: They are not on the continental road system, they each have an airport, and a road link exists between the communities. Four community pairs were identified, and information on traffic, population, and distances between the communities was obtained. A regression equation using population of the communities and distance in road miles to estimate annual average daily traffic had a very high correlation ( $r^2 = 0.967$ ) and all of the variables were statistically significant.

Using this model, potential traffic across a bridge spanning the Naknek River is estimated at about 1,020 vehicle trips per day (supposing it were open in 2003.) Some of these trips would be the replacement of current trips made by airplane and boat, and, when the river is frozen, snow machines and other vehicles. Most of the trips would be new trips generated by the reduction in travel cost and time, and the consolidation of services and facilities. Other trips would be generated by South Naknek residents moving back to the community after having moved to Naknek or King Salmon in recent years for employment opportunities. These people would still be able to retain their jobs in the other communities while living in South Naknek, were a bridge to be built.

In addition to the capital and operating cost comparison, three other approaches were used to compare the scenario/options. These approaches included:

- Comparing the scenario/options with a set of evaluation criteria developed from the public meetings and comments from the public, as well as from the Department of Transportation & Public Facilities' objectives (See Evaluation criteria for a discussion of the scoring system)
- A benefit-cost analysis which summarizes the net present value of a stream of benefits and costs over the life of the facilities (See Benefit-cost analysis)
- A survey of Borough residents to determine the level of support in the community for a bridge and the options associated with it (See Survey)

Table ES - 2 shows the rankings of the scenario/options from each of the evaluation methods.

**Table ES - 2. Comparison of scenario/options**

<b>Scenario/options</b>	<b>Evaluation Criteria</b>	<b>Benefit- Cost Analysis</b>	<b>Subtotal</b>	<b>Resident Survey</b>	<b>Bridge Total</b>
A1. All airports open	7	8	15		
A2. Close Naknek	8	7	15		
B1 All airports open	6	5	11	1	12
B2 Close Naknek	1	2	3	4	7
B3 Close South Naknek	3	4	7	2	9
B4 Close both airports	1	1	2	6	8
B5 Borough operates both	5	5	10	3	13
B6 Borough operates S. Naknek	4	2	6	5	11

By design the resident survey was developed to assess the level of support for a bridge and did not ask questions about the aviation only alternatives. Therefore, the subtotal column presents the rankings for each scenario/option under the evaluation criteria and benefit-cost analysis, while the bridge total incorporates both of those approaches plus the ranking from the resident survey.

The bridge options have greater net benefits than the A2 option with the base case population projection, hence their higher ranking in Table ES - 2. The bridge options also achieve greater net benefits under the low population forecast case. For option B4, the number of induced trips could be reduced to 10 percent of its projected level with a base case population forecast and the benefits would still be larger than those estimated for A2. Other bridge options could see the number of induced trips reduced to 25 percent of estimated levels and still have larger net benefits than A2.

Under any of the bridge options, the Borough would save about \$100,000 annually in reduced expenses through the consolidation of facilities and services, and the provision of



most public services from Naknek, rather than from both communities. The school district would save about \$300,000 annually, primarily by closing the South Naknek school and eliminating two full-time and three part-time jobs. Eliminating the air transportation charter for South Naknek students and replacing that service with buses would save about \$40,000. Total savings for the Borough, School District, local residents, and other organizations are anticipated to be about \$476,000 annually. The Borough has identified three positions that might be filled with the savings from consolidation. The school district board has not yet considered where the savings might be employed but future actions could range from restoring programs that have been cut, to adding new staff, or even providing more materials and supplies.

Annual maintenance costs of about \$45,000 for a bridge would be slightly less than the combined annual maintenance expenditures of about \$30,000 at the Naknek airport and \$20,000 at the South Naknek airport. The annual airport maintenance cost expenditures anticipate that planned capital investments over the next 10 years will increase annual maintenance costs.

A comparison of the results of the various evaluation methods indicates that a bridge scenario consistently ranks above the aviation only scenario. One objective of this study is to provide a recommendation for airport improvements, ownership, and operation if a crossing were built. An evaluation of the bridge options suggests the following:

- Option B2 has the lowest total score and highest ranking, but it would not meet the Department's objectives of cost sharing and reducing operating costs.
- Option B4 would have the next highest ranking but it would not have public support because it would close both general aviation airports.
- Option B3 would have public support because Naknek airport would remain open, and it would achieve reduced operating costs for the Department, but the Department's cost sharing objective is not met.
- Option B6 seems to be the next best option for consideration. This option would provide a general aviation airport as preferred by Borough residents. The Borough could operate South Naknek without the potential problems that might be encountered at Naknek in its current condition.<sup>2</sup> Naknek airport would be closed under this option. This option would also meet the Department's objectives of reducing operating costs and cost sharing, and is the recommended option if a crossing is built.

It is anticipated that any of the bridge alternatives would require an environmental impact statement. The aviation only alternatives may be able to proceed with an environmental assessment. The decision will depend on the issues identified in the scoping process.

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<sup>2</sup> The Borough Mayor stated at a public meeting that he is opposed to the Borough operating the Naknek airport in its present condition due to a number of factors. According to the Mayor, the planned improvements at Naknek airport would have to be completed before he could recommend that the Borough become the operator of the airport.



## What is the reason for this study?

As outlined in the Request for Proposals, the reason for this study is twofold:

1. Identify and quantify the costs and benefits associated with a highway crossing the Naknek River so that this information can be available to Federal, State of Alaska, Bristol Bay Borough and other community, tribal and business leaders
2. Suggest appropriate recommendations for airport improvements, ownership, and operation (or closure if warranted) for the airports at Naknek, South Naknek and King Salmon in the event a Naknek River crossing is built. The study will determine the probable effects of a bridge crossing on aviation use patterns at the three airports. Its findings will take into account the range of transportation needs and options available locally, state and community long-range goals, and overall efficiencies.

The Alaska Department of Transportation and Public Facilities (Department or ADOT&PF) is interested in improving access to communities in Southwest Alaska and reducing its system-wide operation and maintenance costs. Recent planning efforts for Southwest Alaska and the airports at King Salmon and Naknek indicate that the Department might be able to accomplish these goals by extending the road system to South Naknek.

The communities of King Salmon, Naknek, and South Naknek are located on the Naknek River on the northern side of the Alaska Peninsula (See Figure 1). The communities of King Salmon and Naknek are connected by a 15-mile road, the only existing segment of the Alaska Peninsula Highway, which is a designated route of the Alaska Highway System (See Alaska Administrative Code, 17.05.170 (b)(14)).<sup>3</sup> The community of South Naknek is located directly across the Naknek River from Naknek, a distance of about ½ mile. Residents of these two communities use skiffs and aircraft to travel between the communities when the river is open. When the river is sufficiently frozen local residents cross the river on snow machines and other vehicles at a site upriver beyond the area of tidal influence. At present, all three communities have airports that are owned and operated by the State of Alaska. King Salmon is a jet-capable airfield originally built for military use. The other two airports were built to meet the needs of the local communities and general aviation in the region.

The proposed crossing would entail a bridge spanning the Naknek River and connecting these three communities of Bristol Bay Borough. The distance between South Naknek and King Salmon using the crossing would be about 15.5 miles, and roughly 9.5 to 11.5 miles between South Naknek and Naknek depending on the selected alignment. A bridge would influence aviation use patterns and the priority of aviation operations and improvements at individual airport facilities, some of which are already identified and waiting funding.

Alaska Statute 44.42.050 requires the ADOT&PF to prepare a long-term transportation plan in accordance with the federally-required Statewide Transportation Plan as defined in 23

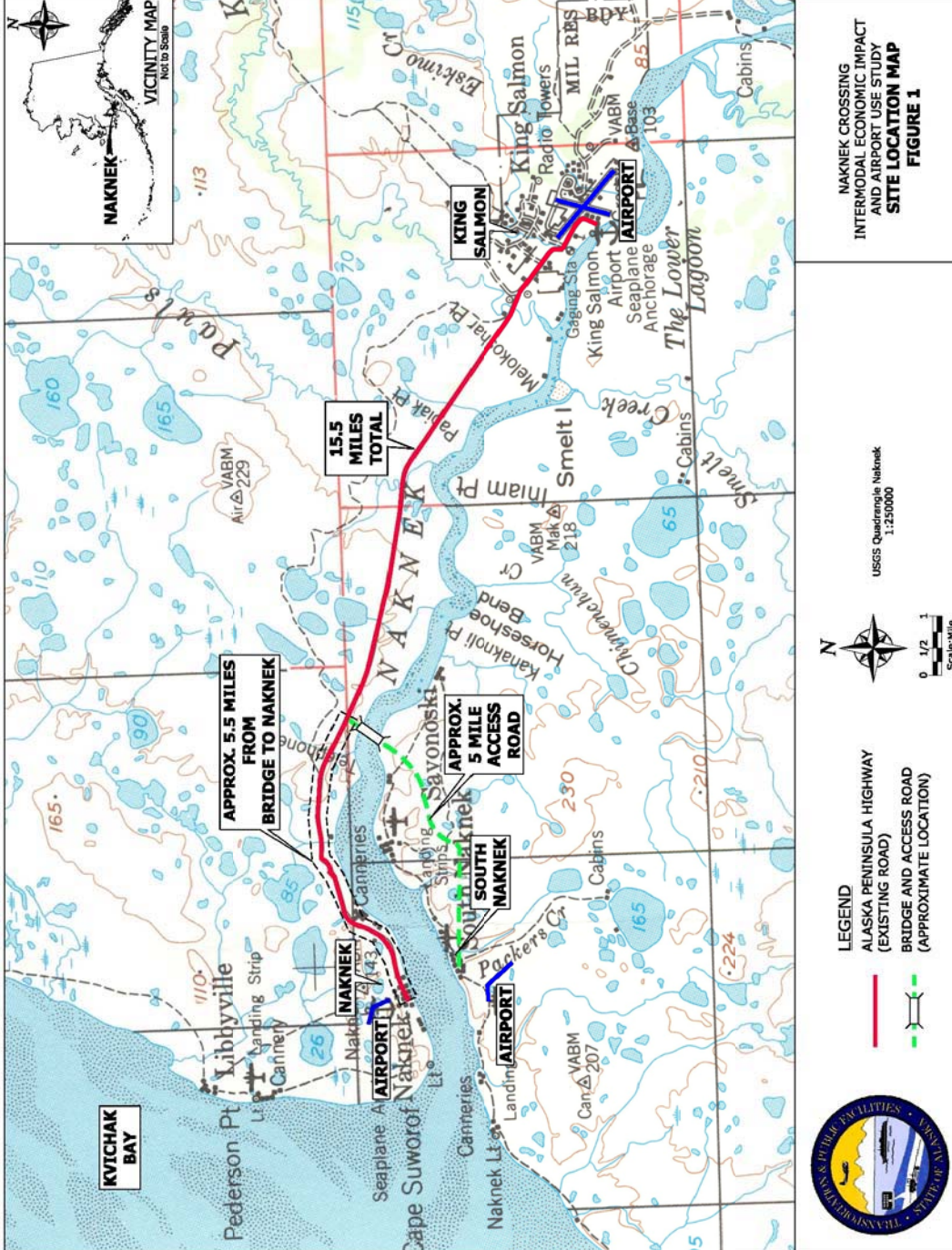
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<sup>3</sup> Governor Murkowski has proposed extending the Alaska Highway System by constructing a road between King Salmon and Chignik, and a bridge across the Naknek River would be an important part of that road project. However, this project is being evaluated solely on the benefits and costs of improving access for residents of the three communities in the Bristol Bay Borough.

CFR 450-214. The Southwest Alaska Transportation Plan is an approved component of the Statewide Transportation Plan. The Southwest Alaska Transportation Plan of 2002 recommended a study to define the appropriate level of transportation investment, and examine the distribution of costs and benefits among various interests.

This project incorporates a combination of airport and roadway planning analysis to determine the impact of a road link on air traffic and aviation facility use. Unlike prior studies that focused only on airport or road construction, this study quantifies costs and benefits using a system-wide analysis, comparing the future costs and benefits of a highway crossing with various airport options, to those of airport improvements only.

This report section, and the following sections, addresses a set of basic questions that were posed by the public at a series of public meetings in the communities to discuss the project. The information has been developed to answer the questions of the general public and address their issues and concerns without adding detail that might be overwhelming to the lay reader. Additional details on this project are contained in the appendices to this main report.



### Figure 1. Study area map



## Why is a bridge being considered?

The Department is interested in a bridge project as part of its long-term goal of seeking greater efficiencies and providing better transportation services. Connecting the three Bristol Bay Borough communities by road would address this goal by providing better transportation services between the communities and potentially reducing costs by eliminating departmental ownership and operational costs of airports that have only a general aviation component.

The Southwest Alaska Transportation Plan recognized that a bridge spanning the Naknek River is desirable for a number of reasons, but concluded that further study is necessary to “better identify the range of services affected and the overall savings such a project would mean for the state and the borough.” The Plan went on to propose a multimodal study to “define the appropriate level of aviation investment, and to examine the distribution of costs and benefits among various interests.” This study is addressing those items. The following paragraphs describe some of the reasons put forward by the public as reasons why a bridge should be built.

At present, persons traveling across the Naknek River use private airplane or air taxi services and, when the river is flowing and free of ice, use skiffs and boats. Automobiles, trucks, all-terrain vehicles, and snow machines are also used to cross the river during winter months when there is sufficient ice thickness on the river. To help meet the need for transportation between the three communities, the Alaska Department of Transportation and Public Facilities owns and operates airports in each community.

The cost of air travel for local residents is an issue. A survey of local residents indicated that South Naknek households spent an average of about \$3,800 in 2003 for air taxi service between their community and the other two communities in the borough. This amount represents about 17 percent of the average household income reported in the 2000 Census. In contrast, residents of the other two communities spent about \$330 for air taxi travel to and from South Naknek.

The State Department of Education changed the formula for pupil transportation funding, so that each student in Alaska is administratively allocated \$1,200 annually for this purpose. This funding covers only about 20 percent of the cost incurred by the school district for school flights. The balance of the school flight cost is covered by local taxes levied by the school district.

The increased cost of air travel and facility operations are only part of the social and economic influences that need to be considered when evaluating a bridge over the Naknek River. Students at the Bristol Bay Consolidated High School that reside in South Naknek are flown each school day to and from the high school, which is located in Naknek. There is high anxiety among parents and students regarding the safety of the flights. Although no serious accidents have occurred, a school flight did once have engine problems, which resulted in the pilot having to land the plane on the river ice. A similar emergency situation during a time when the ice is not present could have dramatic consequences for the community. It takes several trips to fly the approximately 12 students across, and parents are told not to have siblings on the same flight in the event of an accident (See public comments in Appendix B).

The river ice may have saved lives in that incident, but there have been several incidents involving vehicles going through the river ice while traveling between Naknek and South Naknek; one that involved three people in a truck, and another that involved a snow machine with a single rider. Two days after Department staff and consultants made presentations in the communities on March 15 and 16, 2004 a person driving an ATV went through the river ice and was saved by local residents. South Naknek residents sometimes push the limits of safety at the beginning of winter and in spring because travel during these transition periods, (when the ice is not safe enough to drive on and river is not yet free of ice for boat travel), is limited to expensive air taxi or personal airplane travel.

The project team held three sets of meetings in Naknek and South Naknek to discuss the project with local residents and officials. In addition to the items discussed above, a number of other social and economic benefits associated with a bridge were identified by people attending the meetings. These included:

- **Improved educational and social benefits for school-age children.** The school district has been flying South Naknek junior and senior high school students to Naknek regional high school and middle school in Naknek for over 30 years. The school flights operate under Visual Flight Rules (VFR) in daylight only. Thus, in mid-winter, children arrive at school at 9:45 a.m., 45 minutes after school commences. The need to fly in daylight hours also restricts the ability of South Naknek students to participate in after-school activities. If inclement weather is approaching, students sometimes leave school early so that they can get home before air travel is impossible. When students can't return home due to bad weather, the school district incurs costs for housing students in private homes on the north side of the river.

South Naknek parents also felt that attending a school with a larger number of students would be better for the younger children since it would improve their social skills. It was stated that South Naknek students sometimes have a difficult time adjusting to Naknek junior and high schools because they have been in an elementary school with very few students in each class.

- **Improved access to hospitals and clinics for residents of South Naknek.** South Naknek residents felt that a bridge would improve their access to the regional clinic in Naknek, and that potential weather delays of medevac flights from South Naknek to Naknek or Anchorage would be mitigated with bridge access.
- **Improved response time for emergency services and public safety.** The Peter Pan Seafoods plant in South Naknek was engulfed in a major fire in 2001. Several warehouse buildings that held boats and fishing gear burned down, along with a repair shop. Fire equipment and personnel from Naknek and King Salmon could not assist in fighting the fire that also destroyed 30 fishing boats. Emergency medical technicians, state troopers, and other emergency services and public safety personnel from Naknek and King Salmon also have a difficult time responding quickly to emergency situations and assisting their counterparts in South Naknek. Emergency service volunteers in South Naknek pay their own travel costs when they attend training and certification classes in Naknek or King Salmon. A bridge would enable



quicker response times, reduce training and certification costs for emergency services personnel, and improve retention of volunteers.

- **Removing barriers to economic activity in the Bristol Bay Borough.** The economy of the Bristol Bay Borough has suffered in recent years with the decline of the salmon fisheries. Fish processors have concentrated their remaining infrastructure to the north (Naknek) side of the river because of the high costs imposed on South Naknek plants due to the existing transportation infrastructure. A bridge would reduce costs for South Naknek residents and businesses. A bridge could potentially reduce costs enough to allow one or more of the three closed salmon-processing plants in South Naknek to reopen, although this is uncertain, given the difficult times that the salmon industry is facing in the region. In any event, a bridge would enable setnet fishers whose sites are located on the south side of the river to more easily obtain ice, which would improve the quality of fish harvested in the area. Improved quality is very important to fishers as they attempt to obtain higher prices amidst continuing competition from farmed salmon.

At present, many South Naknek residents order groceries and other supplies from Anchorage because it is cheaper to pay the mailing costs than to pay the air taxi fee for shopping at local stores. Residents stated that a bridge would reduce travel costs to the point where it would be less expensive to buy groceries at local stores. South Naknek residents also believe the lower costs would provide opportunities for other businesses to open in the community including a gas station, restaurants, boat haulout and repair, and tourism-related businesses.

- **Reduced expenditures for redundant facilities and services.** At present, there is a duplication of some public facilities and services in South Naknek because the community is not readily accessible to the other towns except by air and water. Closing the South Naknek School, the library, the clinic, and other facilities would reduce local government costs. Larger facilities with better services are present in Naknek and would be accessible with a short drive if a bridge were built. Additional information on the potential savings associated with consolidation of facilities and services is presented in Fiscal Effects. The potential savings would enable the Borough to fill the vacant position in the Planning Department, as well as administrative staff in the Port and Public Works Departments (Pike, 2004)



## What changes are being considered and what would they cost?

This study considers a number of changes, including construction of a bridge as well as closures or improvements to the airports in the borough. The changes are categorized into two scenarios (Aviation Only Improvements and Bridge and Aviation Improvements), with several options for each scenario. If an airport will remain open under a given option, it is assumed that the capital improvements planned for the next 20 years will be completed. If Naknek airport will be closed, it is anticipated that the closure will occur after the bridge opens. If South Naknek is to be closed it is anticipated to occur after 2016 to meet FAA grant assurances. The various scenario/option combinations are:

### **Scenario A. Aviation only improvements**

Option A1. Keep all three airports open

Option A2. Close Naknek airport

### **Scenario B. Bridge and aviation improvements**

Option B1. Keep all three airports open

Option B2. Close Naknek airport

Option B3. Close South Naknek airport

Option B4. Close Naknek and South Naknek airports

Option B5. Bristol Bay Borough operates Naknek and South Naknek airports

Option B6. Close Naknek airport and borough operates South Naknek airport

Throughout the remainder of this report, the various combinations are referred to according to their scenario (A or B) and option (1 through 2 or 1 through 6) designation presented above. For example, the aviation-only improvements with all three airports open, is referred to as A1. A brief description of each scenario/option combination is provided in the following subsections with a table showing the anticipated annual operating cost and total capital cost.

Costs for the aviation-only alternatives include the capital cost for improvements to the airports. Costs for the bridge alternative include bridge construction plus costs for improvements to airports. Costs of operating and maintaining the aviation facilities over the study period are presented, as well as maintenance of the bridge and access roads. The 20-year study period extends to 2033, assuming that the bridge opens in 2014.

Table 1 summarizes the total annual operating costs for each scenario/option. The bridge capital cost estimates are provided as a range because of uncertainty at this concept level of design (See Appendix E for more detail on bridge capital costs). The capital cost information for airport improvements is taken from Airport Master Plans and other documents (See Appendix F) and is made up of single point estimates for the year in which the report was prepared. Construction cost inflation indices are used to update this information to 2003 dollars. Additional information on each scenario/option is presented in the following subsections. Detailed information for each scenario/option is provided in the appendices.

**Table 1. Summary of scenario/option annual operating and capital costs for ADOT&PF**

Scenario/ Option	Annual ADOT&PF Operating Costs (Thousands of 2003\$)			Capital Costs (Millions of 2003\$)		
	Cost (\$)	Change (\$)	Low	High	Change (Low)	Change (High)
A1	787		68	68		
A2	757	-30	49	49	-19	-19
B1	831	45	94	107	26	40
B2	803	17	75	88	7	21
B3	812	25	89	103	22	35
B4	782	-5	71	84	3	16
B5	782	-5	94	107	26	40
B6	782	-5	75	88	7	21

Notes: Differences reflected in the Change columns may not add due to rounding. The numbers shown in this table have been adjusted to reflect 2003 dollars. Estimates shown in Tables 3 through 10 later in this section reflect the costs in the year in which the original estimates were created.

Table 1 shows the annual operating costs that might be incurred by ADOT&PF for each scenario/option, and presents data on the change in those annual operating costs compared to A1, which is the closest scenario/option to the status quo. Scenario/option A2 would result in the lowest annual operating costs for the department but reductions in annual operating costs could also be achieved with B4, B5, and B6. A2 would also result in the lowest capital costs for the Department. B4 would have the next lowest capital expenditures although that scenario/option would be about \$3 million to \$16 million more in capital expenditures than A1.

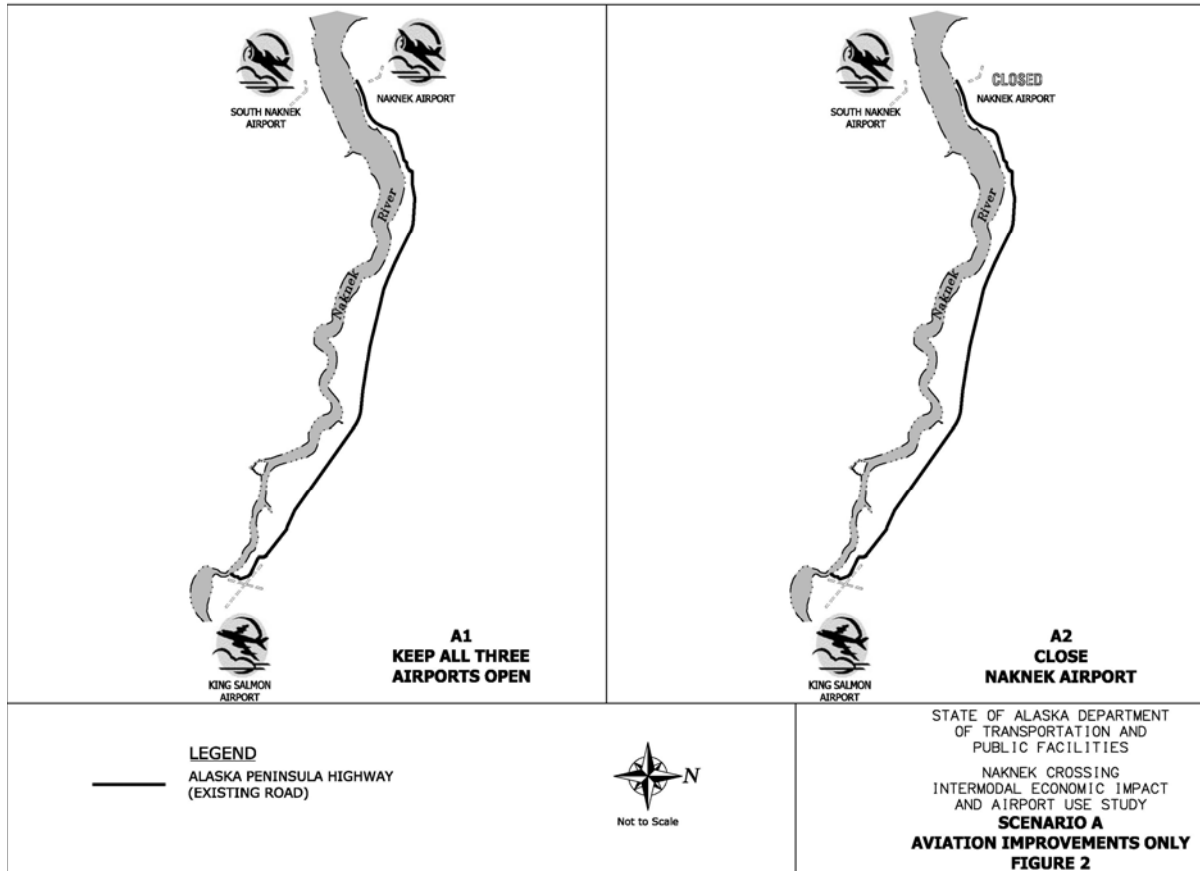
The selection of a scenario/option has implications for other local government entities as well as ADOT&PF. Table 2 shows the estimated change in operations and maintenance costs associated with each scenario/option compared to A1 (See Capital and operating costs for more details).

**Table 2. Summary of change in annual operating costs for state and local governments by scenario/option**

Scenario/ Option	Annual Operating Costs (Thousands of 2003\$)				Total
	Borough	School District	Other Organizations	ADOT&PF	
A1	0	0	0	0	0
A2	0	0	0	-30	-30
B1	-100	-300	-76	45	-431
B2	-100	-300	-76	17	-459
B3	-100	-300	-76	25	-451
B4	-100	-300	-76	-5	-481
B5	-50	-300	-76	-5	-431
B6	-78	-300	-76	-5	-459

**Naknek Crossing Intermodal Economic and Airport Use Study**  
**An approved component of the Alaska Statewide Transportation Plan 4/25/2005**

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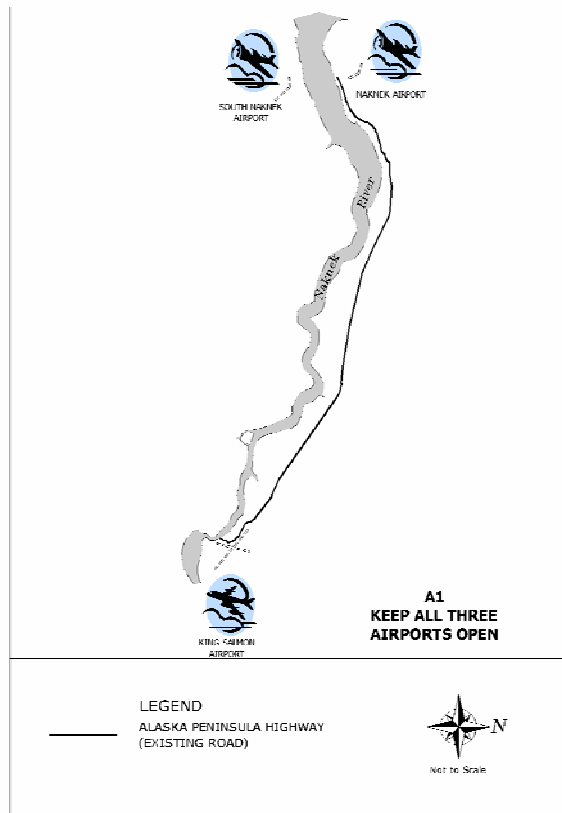


**Figure 2. Proposed transportation system with aviation improvements**

## Scenario A – Aviation Only Improvements

### Option A1. Keep All Three Airports Open

This scenario/option would improve access by implementing planned improvements at all three airports in the Bristol Bay Borough. This scenario/option does not include a bridge.



Airport master plans were prepared for the King Salmon and Naknek airports in 2001 and form the basis for the improvements discussed here. Most of the information for South Naknek comes from an airport layout plan (ALP) prepared by ADOT&PF for that facility. The capital improvements for the three airports are anticipated to be implemented over a 20-year period that starts when a decision is made on which scenario and option to develop. Table 3 shows the annual operating costs after year 10, when most of the improvements at Naknek airport are assumed to be complete. It also shows the total capital costs over the 20-year period. The operating and capital costs shown here are taken directly from the various reports and have not been updated to 2003 dollars in these tables. Additional information on the assumptions used in preparing these estimates is presented in the assumption notes below the table.

**Table 3. Option A1: Keep all 3 airports open**

<b>Airport</b>	<b>Annual operating costs (\$)</b>	<b>Capital costs (\$)</b>
King Salmon	737,088	39,589,300
Naknek	29,962	20,947,000
South Naknek	19,806	3,910,000
Total	786,856	64,446,300

**Assumptions:**

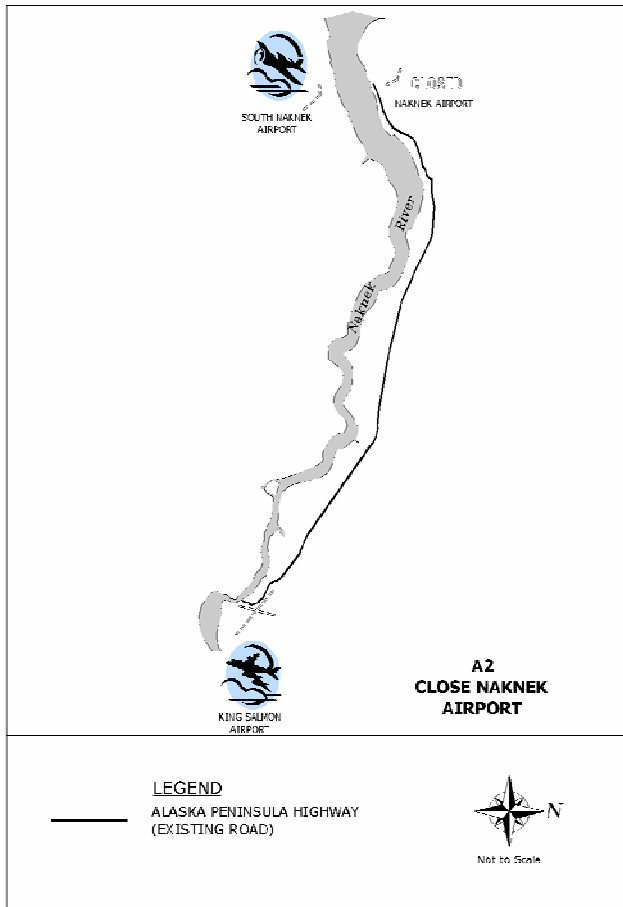
1. By year 10, when most improvements are assumed to be made at the Naknek Airport, operating costs increase by \$13,000/year to \$29,962 due to increased electrical costs (\$5,000/year) and maintenance (\$4,000) of a new functional lighting system and increased fuel and manpower costs (\$4,000) of maintenance and snow removal for runways, taxiways and aprons. Until then operating costs are \$16,962.
2. Even though the South Naknek ALP indicates that it could be upgraded to B-II standards in the long term future, for planning purposes it is assumed that it can continue to be developed to B-I standards, similar to the planned standards for the Naknek Airport.
3. South Naknek CIP costs from the ALP include \$2.2 million in 1-5 years for resurfacing, a \$1 million road extension around runway 4-22 in 6-10 years, and \$650,000 for a new grader and lighting upgrades in 11-20 years.
4. The capital costs include wind protection improvements not presented in the master plan. If wind protection is provided for general aviation aircraft it will be provided for all general aviation aircraft at each airport.



## Option 2 – Close Naknek Airport

This scenario/option would close the Naknek airport and implement the planned improvements at King Salmon and South Naknek airports over a 20-year period. This option

does not include a bridge. It is assumed that the closure of the Naknek airport would occur after completion of wind protection and other improvements at the King Salmon and South Naknek airports to accommodate planes that presently operate from the Naknek airport. These wind protection improvements are only added when an option calls for closure of the Naknek airport. Closure of the Naknek airport might permit improvements at Nornak Lake that would improve facilities for floatplanes, but the potential for such improvements will be the subject of a planned study of floatplane aviation in the borough. This study does not address potential improvements at Nornak Lake. Table 4 presents annual operating costs and capital costs for this scenario/option. The savings from closure of the Naknek airport are almost \$21 million in capital costs and \$30,000 in annual operating costs.



**Table 4. Option A2: without bridge – close Naknek Airport**

<b>Airport</b>	<b>Annual Operating Costs (\$)</b>	<b>Capital Costs (\$)</b>
King Salmon	737,088	40,959,300
Naknek	0	0
South Naknek	19,806	5,260,000
<b>Total</b>	<b>756,894</b>	<b>46,219,300</b>

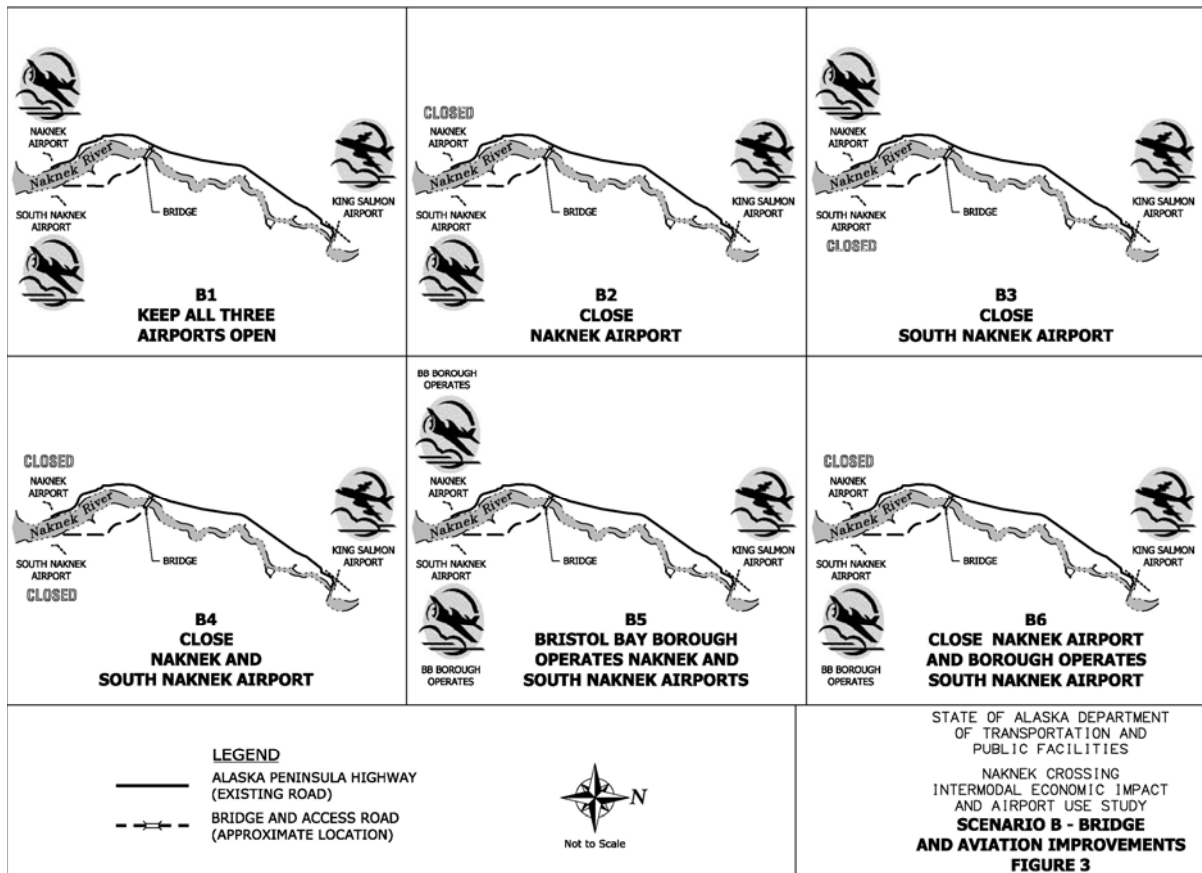
Assumptions:

1. Naknek operating costs (\$16,962/year) cease to be paid in 3 to 5 years when ADOT&PF ceases to operate the airport under the aviation only scenario.
2. Additional tie down space is provided at the King Salmon Airport at a cost of \$2,800,000. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
3. Addition of general aviation tie downs does not have measurable effect on operating costs at King Salmon.

## **Scenario B – Bridge with aviation improvements**

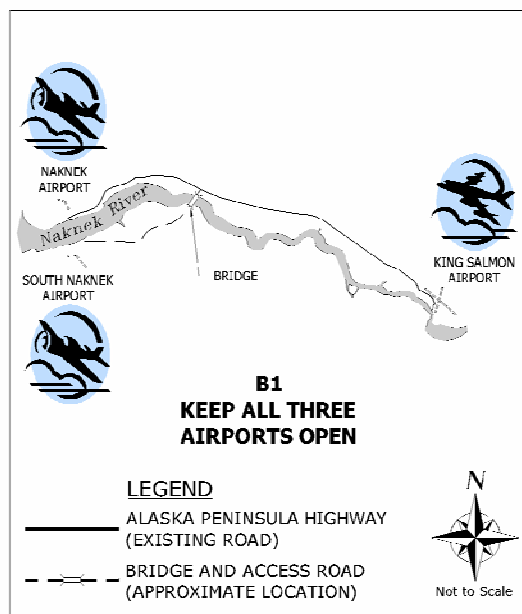
A bridge spanning the Naknek River has been discussed at the conceptual level for the past several decades. For purposes of this analysis, it is assumed that a bridge would be built near Fishery Point (See Figure 1), although sufficient engineering has not been undertaken to know if this location would be a suitable bridge site. The bridge would likely be constructed with long-span steel girders between piers to facilitate maritime traffic and reduce the amount of construction activity and obstructions in the river. Additional detail on the bridge concept is provided in Appendix E.

The following tables show capital and operating costs for the bridge as well as airport options that may be associated with a bridge across the river. The bridge design is only conceptual at this stage of the process, and a range of capital and operating costs have been developed to account for the large amount of uncertainty that presently exists. The proposed bridge and roadway would be part of the Alaska Highway System, and the road is likely to be paved, providing the same level of service as the existing Alaska Peninsula Highway segment. This assumption of a paved (rather than gravel) road results in the operating cost estimate used in the following tables. The bridge/roadway operating costs include \$44,550 per year for pavement maintenance on the bridge and road. The steel girders are treated during construction with a permanent anti-corrosion sealant so maintenance painting is not required. Operating cost estimates that assume a gravel road are presented in Appendix E. Capital costs for a steel girder bridge across the Naknek River range from a low estimate of \$26,250,000 to a high estimate of \$39,500,000. Given the large variation in the range, both estimates are provided in the following tables. Airport capital costs represent planned improvements over the next 20 years as indicated in Airport Master Plans and Airport Improvement Plans, and annual operating costs are based on present contractor and ADOT&PF costs. The airport capital costs also include wind shelters with certain options. Figure 3 shows the six options associated with the bridge scenario.



**Figure 3. Proposed transportation system with bridge access and aviation options**

## Option B1 – Keep all three airports open



This scenario/option would develop a road and bridge across the Naknek River and implement planned improvements at all three airports in the Bristol Bay Borough. As shown in Table 5, the airport costs are the same as presented in option A1 (Table 3); the inclusion of the bridge operating and capital costs are the only differences. Under this combination, annual operating costs increase to over \$1 million, and capital costs range from more than \$90 million to almost \$104 million. This scenario/option is the most expensive combination under consideration. This option is described here but is not further evaluated because the Department would not build a bridge *and* undertake improvements at all three airports.

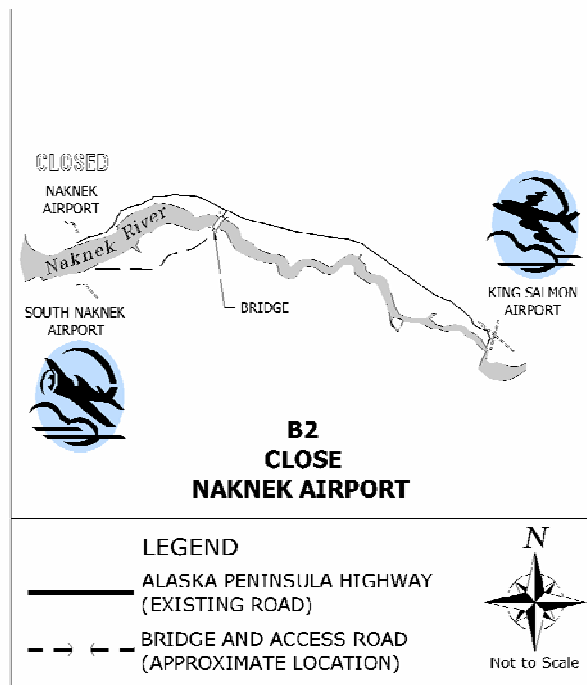
**Table 5. Option B1: With bridge – keep all three airports open**

Bridge/Airport	Annual Operating Costs (\$)	Capital Costs (\$)	
		Low	High
King Salmon	737,088	39,589,300	39,589,300
Naknek	29,962	20,947,000	20,947,000
South Naknek	19,806	3,910,000	3,910,000
Subtotal	786,856	64,446,300	64,446,300
Bridge	44,550	26,250,000	39,500,000
Total	831,406	90,696,300	103,946,300

**Assumptions:**

1. By year 10, when most improvements are assumed to have been made at the Naknek Airport, operating costs increase by \$13,000/year to \$29,962 due to increased electrical costs (\$5,000/year) and maintenance (\$4,000) of a new functional lighting system and increased fuel and manpower costs (\$4,000) of maintenance and snow removal for runways, taxiways and aprons. Until then operating costs are \$16,962.
2. Even though the South Naknek ALP indicates that it could be upgraded to B-II standards in the long term future, for planning purposes it is assumed it can continue to be developed to B-I standards, similar to the planned standards for the Naknek Airport.
3. South Naknek CIP costs include \$2.2 million in 1-5 years for resurfacing, a \$1 million road extension in 6-10 years, and \$650,000 for a new grader and lighting upgrades in 11-20 years.

## Option B2 – Close Naknek Airport



Closure of the Naknek airport would follow the opening of a road and bridge spanning the Naknek River in this scenario/option. As stated previously, bridge construction is assumed to begin in 2012 with the bridge opening in 2014. Under options calling for closure of the Naknek airport, the airport would remain in operation until the bridge is open. Compared to B1, this combination results in cost savings of approximately \$30,000 in annual operating costs and \$18 million in capital costs. Similar to A2, this scenario/option set might enable future improvements at Nornak Lake if the planned floatplane study makes such recommendations.

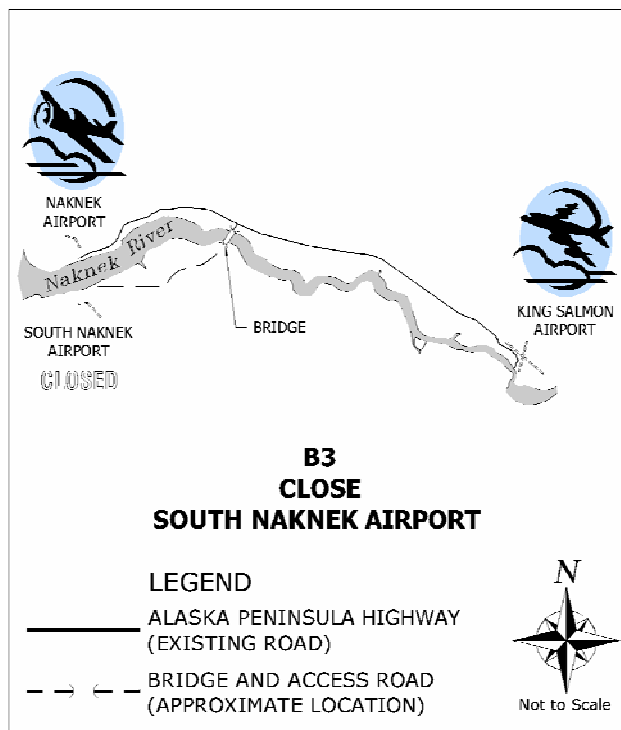
**Table 6. Option B2: With bridge – close Naknek Airport**

Bridge/Airport	Annual Operating Costs (\$)	Capital Costs (\$)	
		Low	High
King Salmon	737,088	40,959,300	40,959,300
Naknek	0	0	0
South Naknek	21,806	5,260,000	5,260,000
Subtotal	758,894	46,219,300	46,219,300
Bridge	44,550	26,250,000	39,500,000
Total	803,444	72,469,300	85,719,300

**Assumptions:**

1. Naknek operating costs (\$16,962/year) continue to be paid until the bridge is open.
2. Additional tie down space is provided at the King Salmon and South Naknek airports at a cost of \$1,400,000 for each airport. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
3. Additional maintenance and snow removal of general aviation tie downs and access taxiway adds \$2,000/year to the South Naknek operating costs when the bridge is open.
4. Addition of general aviation tie downs does not have measurable effect on operating costs at King Salmon.

### Option B3 – Close South Naknek Airport



This combination would close the South Naknek airport upon completion of a road and bridge crossing the Naknek River. Planned improvements at the Naknek and King Salmon airports would be implemented. For options that include closure of the South Naknek airport it is anticipated that the airport would remain open until 2017, the year in which grant assurance to the Federal Aviation Administration (FAA) would end. Under this scenario/option, capital costs would be reduced by about \$4 million in comparison to B1, and annual operating costs would be reduced by about \$20,000.

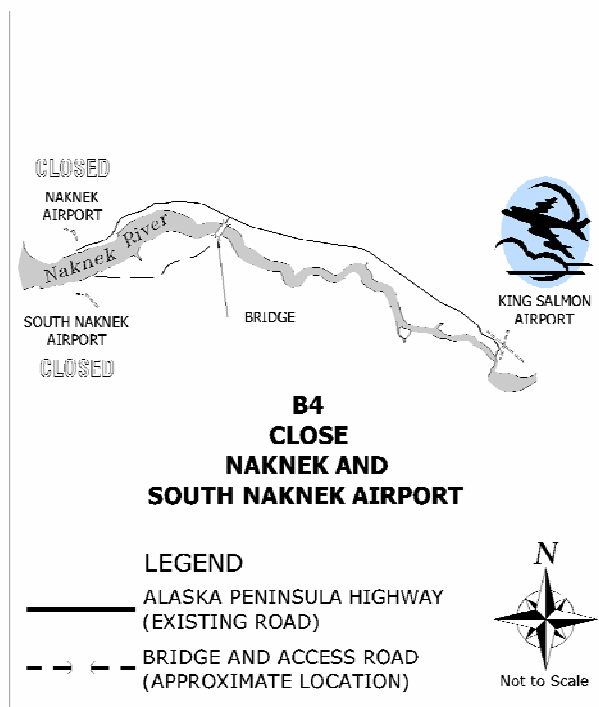
**Table 7. Option B3: With bridge – close South Naknek Airport**

Bridge/Airport	Annual Operating Costs (\$)	Capital Costs (\$)	
		Low	High
King Salmon	737,088	39,349,300	39,349,300
Naknek	29,962	21,007,000	21,007,000
South Naknek	0	0	0
Subtotal	767,050	60,356,300	60,356,300
Bridge	44,550	26,250,000	39,500,000
Total	811,600	86,606,300	99,856,300

**Assumptions:**

1. The planned South Naknek airport resurfacing project can be eliminated and the existing surface can safely meet needs until the bridge is built.
2. South Naknek Airport remains open through 2016 when the FAA grant has been amortized or the FAA and ADOT&PF can work out an arrangement where unamortized grant funding invested in the South Naknek Airport does not need to be paid back or can be applied to the planned investments in the Naknek Airport.
3. South Naknek operating costs (\$19,806/year) continue to be incurred until the bridge is open.

### Option B4 – Close Naknek and South Naknek Airports



This scenario/option set would close the Naknek and South Naknek airports when the road and bridge are completed. The Naknek airport would close in 2014 when the bridge is assumed to open, and South Naknek would close in 2017. Planned improvements at the King Salmon airport would be undertaken, and all aviation activity associated with wheeled planes would occur at the King Salmon airport. Improvements for floatplanes at Nornak Lake could result with closure of Naknek airport. Compared to B1, this scenario/option saves about \$50,000 in annual operating costs and about \$22 million in capital costs.

**Table 8. Option B4: With bridge – close Naknek and South Naknek Airports**

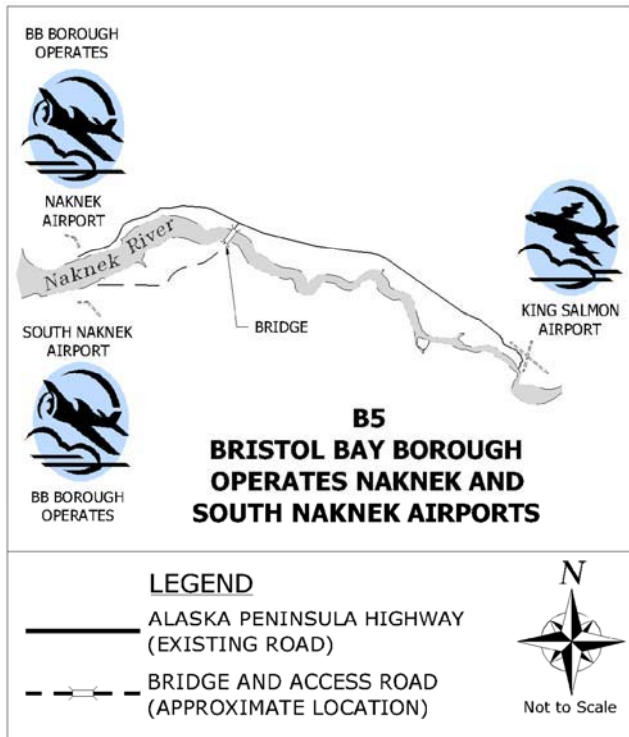
Bridge/Airport	Annual Operating Costs (\$)	Capital Costs (\$)	
		Low	High
King Salmon	737,088	42,629,300	42,629,300
Naknek	0	0	0
South Naknek	0	0	0
Subtotal	737,088	42,629,300	42,629,300
Bridge	44,550	26,250,000	39,500,000
Total	781,638	68,879,300	82,129,300

Assumptions:

1. The planned South Naknek airport resurfacing project can be eliminated and the existing surface can safely meet needs until the bridge is built.
2. Additional tie down space is provided at the King Salmon Airport at a cost of \$2,800,000. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
3. South Naknek Airport remains open through 2016 when the FAA grant has been amortized or the FAA and ADOT&PF can work out an arrangement where unamortized grant funding invested in the South Naknek Airport does not need to be paid back or can be applied to the planned investments at the King Salmon Airport.
4. South Naknek operating costs (\$19,806/year) and Naknek operating costs (\$16,962/year) continue to be incurred until the Bridge is open.
5. Addition of general aviation tie downs does not have a measurable effect on operating costs at King Salmon.



## Option B5 – Bristol Bay Borough operates Naknek and South Naknek Airports



This combination is similar to B1 in that all three airports would remain open after the bridge is completed, but the Bristol Bay Borough (or BB Borough as used in adjacent figure) would operate the Naknek and South Naknek airports under this scenario/option. Planned improvements at the three airports would also be completed, with the Naknek and South Naknek airport improvements finished prior to the date on which the facilities are transferred to the borough. Total capital costs and operating costs would remain the same as B1, but the state's operating costs would be reduced to about \$780,000, with the Bristol Bay Borough responsible for about \$50,000 of the operations and maintenance costs (See Table 9).

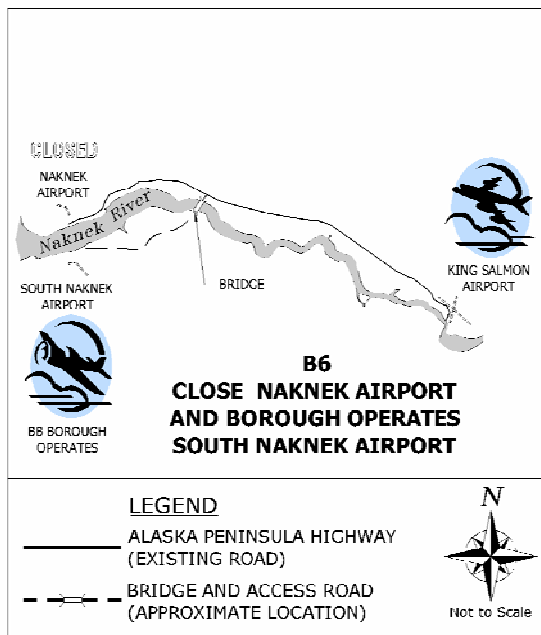
**Table 9. Option B5: With bridge – Bristol Bay Borough operates Naknek and South Naknek Airports**

Bridge/Airport	Annual Operating Costs (\$)		Capital Costs (\$)	
	Borough	State	Low	High
King Salmon	0	737,088	39,589,300	39,589,300
Naknek	29,962	0	20,947,000	20,947,000
South Naknek	19,806	0	3,910,000	3,910,000
Subtotal	49,768	737,088	64,446,300	64,446,300
Bridge	0	44,550	26,250,000	39,500,000
Total	49,768	781,638	90,696,300	103,946,300

**Assumptions:**

1. Bristol Bay Borough operating costs will be comparable to the State of Alaska's current costs. Some costs could be higher while other costs could be lower.

## Option B6 – Close Naknek Airport and Bristol Bay Borough operates South Naknek Airport



Under this scenario/option the Naknek airport is closed when the bridge opens in 2014, and the State of Alaska transfers responsibility for operating the South Naknek airport to the Bristol Bay Borough (BB Borough) after the bridge is built. Planned improvements at the South Naknek and King Salmon airports are implemented, and the South Naknek improvements are completed before the facility is transferred to the borough. This scenario/option reduces the state's annual operating costs by almost \$50,000 in comparison to B1, but the borough's costs increase about \$21,800. The capital costs for this scenario/option are about \$21 million less than for B5.

**Table 10. Option B6: With bridge – close Naknek Airport and Borough operates South Naknek Airport**

Bridge/Airport	Annual Operating Costs (\$)		Capital Costs (\$)	
	Borough	State	Low	High
King Salmon	0	737,088	39,589,300	39,589,300
Naknek	0	0	0	0
South Naknek	21,806	0	3,910,000	3,910,000
Subtotal	21,806	737,088	43,499,300	43,499,300
Bridge	0	44,550	26,250,000	39,500,000
Total	21,806	781,638	69,749,300	82,999,300

Assumptions:

1. Naknek operating costs (\$16,962 per year) continue to be paid until the bridge is open.
2. Additional tie down space is provided at the King Salmon and South Naknek Airports at a cost of \$1,400,000 for each airport. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
3. Additional maintenance and snow removal of general aviation tie downs and access taxiway adds \$2,000 per year to the South Naknek operating costs once the bridge is open.
4. Addition of general aviation tie downs does not have a measurable effect on operating costs at King Salmon.
5. Bristol Bay Borough operating costs will be comparable to the State of Alaska's current costs. Some costs could be higher while other costs could be lower.



## **What are the potential effects of the proposed changes?**

This section summarizes the various beneficial and adverse effects associated with the construction, operation, and potential closure(s) under the scenarios/options. These effects include social, economic, and biological effects, as well as those related to changes in the existing transportation patterns. Additional detail on these effects, as well as background information on the environment, communities, and transportation systems is provided in the appendices for those readers who may be unfamiliar with the existing conditions.

### **Human environment**

This section addresses the role of the transportation system in the area, the factors affecting future transportation demand, with and without a bridge, and the potential financial and economic effects of the scenarios and options on the government and private sectors.

### **Transportation**

In addition to the construction of new facilities and/or closure of such as described in What changes are being considered and what would they cost?, the scenarios and options will have different effects on the transportation system in the borough. The following subsections describe the changes in aviation activity — with and without a bridge — and the number of trips across the Naknek River in the event a bridge is built.

#### **Bridge forecasts**

A bridge across the Naknek River will provide road access to South Naknek and thereby increase the number of trips that residents of South Naknek make between Naknek and King Salmon, and the number of trips that residents of the latter two communities make to South Naknek.

Even after construction of this bridge crossing, the three communities will be isolated from other road systems in Alaska. The airport at King Salmon will provide the primary mode of passenger travel to and from other communities in the state and the Lower 48 states, and tugs and barges will be the primary mode of transport for fuel and freight to and from the three communities. A bridge alternative will, however, increase the interaction between the communities by reducing the current cost of travel, whether expressed in terms of dollars (e.g., airfare between King Salmon and South Naknek), or time (e.g., boat crossing between Naknek and South Naknek).

The current number of trips between South Naknek and the other two communities in the Bristol Bay Borough is not well documented. Some limited information is available on air transport passenger and freight volumes, but the only data on travel by skiff, landing craft, tug and barge, automobile, or snow machine across the river come from a survey of borough residents conducted for this study (See Appendix J for additional detail on the survey). Table 11 shows the estimated number of round trips across the Naknek River by community of residence and by mode of travel in 2003. No information was obtained on the number of trips

made by nonresident fishers, other seasonal nonresident workers, and visitors to the community, so the information presented in Table 11 underestimates the total number of trips. The estimate of more than 25,600 trips equates to about 71 trips per day.

**Table 11. Estimated number of trips across Naknek River  
by mode of travel, 2003**

Mode of travel	Round Trips			Total
	King Salmon	Naknek	South Naknek	
Air taxi	1,044	2,489	4,144	7,677
Private plane	3,169	2,774	249	6,192
Skiff or boat	1,683	5,354	2,063	9,100
Snow machine	210	215	174	599
Other vehicle	921	106	1,046	2,073
Total	7,027	10,948	7,676	25,651

Note: At a public meeting where these data were presented it was stated that the number of trips by snow machine or other vehicle would be higher in most years preceding and following 2003, that year having been a very warm year, with the river only frozen for a short period.

The cost of travel in terms of dollars and the time required to travel back and forth across the river deters travel between the communities. If a bridge is built, these costs will be reduced and the number of trips will increase. A bridge would substantially change the transportation system in the borough, although it is difficult for individuals to estimate the number of future trips they *might* make when the bridge does not exist. When a person's stated preference in a survey is not likely to be a reliable predictor of future trips, economists typically turn to other sources of data and models that can reveal estimates of such trips.

There are other communities around the state that have analogous situations, and it was hypothesized that existing travel data between these communities could be used to project future travel between South Naknek and the other two Bristol Bay Borough communities once a bridge alternative is in place. Four relevant community pairs were identified from around the state with annual average daily traffic count information. These community pairs included:

Naknek – King Salmon	Klawock – Thorne Bay
Seldovia – Jakolof Bay	Nome – Teller

Table 12 shows the sum of 2003 population estimates for each community-pair, the average annual daily traffic (AADT) counts between each community-pair for 2003, and the mileage between each community-pair. Population data are from the Alaska Department of Labor and Workforce Development (ADOLWD) website, except data for Jakolof Bay which is from the Alaska Department of Commerce, Community, and Economic Development website. Jakolof

Bay population is not reported by ADOLWD. AADT estimates for 2003 are taken from the Annual Traffic Volume reports presented on the Alaska Department of Transportation and Public Facilities (ADOT&PF) website. The AADT counts were selected for a road segment near a mid-point between the community pairs with a goal of minimizing influence of local community travel on the traffic counts. Mileage estimates for the Northern and Central Regions are taken from the Annual Traffic Volume reports, while estimates for the Southeast community-pairs are based on the Alaska Milepost.

**Table 12. Community pair data**

<b>Community Pairs</b>	<b>Sum of Population</b>	<b>Travel Distance (miles)</b>	<b>Annual Average Daily Traffic</b>
King Salmon – Naknek	999	15.5	1,010
Seldovia – Jakolof Bay	339	11.8	45
Nome – Teller	3,690	72.2	25
Craig – Klawock	2,025	6.5	2,060

A multiple regression analysis using SPSS (Statistical Package for the Social Sciences) was employed to estimate AADT based on the population of the community-pair, and the distance between them. The population and travel distance data for each community pair can be substituted into the equation and used to develop an estimate of the AADT that exists between the community pair. Since South Naknek will be interacting with both Naknek and King Salmon, the total population of the latter two communities was used along with a weighted average distance factor of 11.8 miles.

Table 13 compares the actual AADT for the four community pairs with the estimated AADT from the equation, as well as the estimated AADT for trips between South Naknek and the other two Bristol Bay communities using the equation. If separate AADT estimates are developed for South Naknek-Naknek and South Naknek-King Salmon, the combined estimated AADT are approximately 100 trips greater than what is shown in Table 13. The number of trips between South Naknek and Naknek alone is estimated at 806 trips, which is greater than the current number of trips between Naknek and King Salmon. This is to be expected since the model indicates that distance has a greater influence than population; the coefficient for distance is -52.051 (which means that the number of trips declines by 52 trips for each additional mile of distance between the communities), and the coefficient for population is 0.858 (each additional person in the two communities will add 0.858 trips). See Appendix I for additional information on the traffic forecasting methodology.

**Table 13. Actual and estimated average annual daily traffic, 2003**

<b>Community Pairs</b>	<b>AADT</b>	<b>Estimated AADT</b>
King Salmon – Naknek	1,010	740
Seldovia – Jakolof Bay	45	350
Nome – Teller	25	105
Craig – Klawock	2,060	2,100
South Naknek – Naknek/King Salmon (population of 1,101)		1,020

A comparison of the actual AADT data with the estimated AADTs suggests that the equation may be an acceptable means for estimating future trips with a bridge alternative. The equation indicates that about 1,020 daily passenger vehicle trips might occur if a bridge were available between South Naknek and the other two communities in 2003 (with the three communities having a total combined population of 1,101). Recall that in 2003, Bristol Bay Borough residents indicated that they make about 71 round trips (142 one-way trips) per day with the existing situation. The difference between the 1,020 estimated trips in 2003 with a bridge, and the estimate of 142 current resident trips from the survey, or 878 trips, represents new trips that would be induced by the presence of the bridge, and the resulting lower cost of transportation.

The estimated AADT in Table 13 does not include any possible changes in future economic conditions or population changes in South Naknek that might occur with a bridge. Such changes are addressed in the following paragraphs.

The level of traffic will change over time as the population in the Borough and particularly South Naknek changes. Population changes in the Borough will be driven to a large extent by economic opportunities surrounding the Bristol Bay fishing industry. As noted in Appendix C, ‘Community Profile,’ the salmon industry is in a state of flux, and it is difficult to foresee what the future will hold for the local seafood industry and residents. Given the difficulty in reliably forecasting future economic conditions for the industry, this study uses a scenario-based approach to describe what the future might hold for the region. This scenario-based approach attempts to provide a range within which the future may occur, and enables the analyst to assess the viability of a project or its impacts within this range of futures.

As described in Appendix I, the forecasts are predicated on changes in local economic conditions. The base case forecast anticipates a continuation of the trends described in Appendix C that have taken shape over the past 13 years. The low case would see economic conditions deteriorate, and the most negative trends experienced over the past 13 years would be expected. Conversely, the high case would see economic conditions improve, and the population would increase in response to those conditions. The turnaround in economic conditions is not expected to occur immediately, so the current trends of decreasing population in King Salmon and Naknek would, under these assumptions, continue until about 2010, the point at which economic conditions might have improved enough to encourage population growth.



Table 14 shows the projected AADT for passenger vehicles across the proposed Naknek River Bridge between South Naknek and the other two communities in the Bristol Bay Borough during the first 20 years of operation for each of the scenarios described above.

**Table 14. Projected average annual daily passenger vehicle traffic across a Naknek River bridge, 2014 - 2033**

Scenario	Year				
	2014	2019	2024	2029	2033
Base Case	938	966	994	1,023	1,045
Low Case	498	441	383	326	280
High Case	945	1,105	1,265	1,427	1,557

The number of people traveling across the bridge can be estimated by multiplying the number of vehicle trips (AADT) by the average number of people in a vehicle (vehicle occupancy rate). An occupancy rate specific to the Naknek-King Salmon road is not available, so a national average of 1.7 for all trips not in a metropolitan statistical area (Nationwide Personal Transportation Survey, 1990) was used to project the person-trip estimates shown in Table 15.

**Table 15. Projected average annual daily person-trips across a Naknek River bridge, 2014 - 2033**

Scenario	Year				
	2014	2019	2024	2029	2033
Base Case	1,594	1,642	1,690	1,738	1,777
Low Case	846	749	652	554	476
High Case	1,607	1,878	2,151	2,426	2,647

### **Aviation forecasts**

There is great variation in estimates of air traffic and characteristics at King Salmon, Naknek, and South Naknek Airports, as well as for float plane operations on Nornak Lake and the Naknek River. This is due to the following factors:

- Forecasts from the Airport Master Plans are higher than actual activity levels because the region's economy and population have declined more rapidly and dramatically than anticipated.
- No recorded data exists beyond the King Salmon Air Traffic Control Tower and certificated air carrier reporting.

In this section, the baseline and forecasted air traffic from the 2001 Master Plans, FAA Terminal Area Forecasts, FAA 5010 forms, factors from models generated in the Yukon-

Kuskokwim Area Transportation Plan, the Southwest Alaska Transportation Plan, and estimates by area residents and operators are all considered. Conversations with local airport operators have provided the basis for describing types of air travel.

### ***King Salmon Airport Traffic***

The following table shows the 2001 Airport Master Plan base year and forecasts through 2019. A median between base year 1996 and 2004 is also shown, as a basis for comparison with Tower Counts for 2001.

**Table 16: 2001 King Salmon Airport Master Plan forecasts**

	<b>1996</b>	<b>2001</b>	<b>2004</b>	<b>2009</b>	<b>2019</b>
Aircraft Operations	33,284	34,942	36,600	39,316	44,745
Enplaned Passengers	51,707	55,556	59,404	68,694	87,278
Total Based Aircraft	40	40	40	40	42
Air Cargo/Mail (tons)					
Enplaned Freight (tons)	3,500	3,500	3,500	3,500	3,500
Enplaned Mail (tons)	400	500	600	600	1,100

Note: 2001 estimate is the 1996-2004 median.

The FAA's Terminal Area Forecasts are currently updated with historical data provided by the Control Tower through 2001. This operation figure shows 25,926 operations, 9,016 less than the Master Plan estimated for 2001. However, the Master Plan estimates were partly tied to an annual population growth rate of about 2 percent, which is significantly higher than the actual rate of population growth in the borough.

### ***Naknek Airport Traffic***

The forecasts prepared for the 2001 Naknek Airport Master Plan are shown in the following table. There was a wide range of differing estimates for 1996 traffic, from 53,500 operations per year listed in the 1990 FAA Airport Master Record, to the FAA Terminal Area Forecast estimate of 29,000. Local operators estimated 27,000. Responses from a local and non-local pilot survey were also reviewed, and appeared to support the Master Record estimate. Enplaned freight and passengers were not forecasted. Air carrier records showed 2,310 commuter passenger enplanements in 1996, which probably did not include about 3,500 student-charter enplanements per year. These results from the 2001 Airport Master Plan are shown below, with an average peak day added to help visualize the activity at Naknek Airport:

**Table 17: 2001 Naknek Airport Master Plan Forecasts**

	1997	2002	2007	2017
Forecasted Operations	53,500	57,464	61,723	71,210
Average Day Peak Month (based on King Salmon proportions)	610	655	704	811
Passenger Enplanements (1996)	5,810			

The Naknek Airport Forecasts are revised in this study because a variety of factors have changed dramatically since *historical* data were used to produce the 1990 Airport Master Record.

These changes include:

- Penair stopped scheduled service to Naknek in 1999, which represented about 10,000 flights annually. Most of these operations were conducted at adjacent Tibbetts Airfield. However, because Penair uses the descriptive identifier “NNK” (for North Naknek) in their carrier reports, older historical reports of their activity may have been included in “5NK”, Naknek Airport.
- Fish-spotting from the air became illegal in 1997, which may account for the historically large number of operations, and relatively low passenger enplanements. These could easily have represented 40 operations a day through the summer months.
- Many of the canneries/fisheries have closed in recent years. Operations on behalf of the canneries once represented about 50 operations a day in the summer. This activity involved both the acquisition of goods and services available in Naknek, and the transportation of workers.

Naknek Airport provides secondary air service to the community of Naknek, since Naknek is connected by road to the larger King Salmon Airport. However, it does provide essential service to South Naknek, both in the transport of schoolchildren, and to South Naknek families traveling to Naknek for goods and services. There are also flights from other towns in the region, such as Egegik, which are primarily trips for supplies available in Naknek, especially for private fish camps.

In addition, the airport provides convenient fueling and maintenance facilities for itinerant aircraft. It also provides wind protection for small aircraft based there and for exposed aircraft at other airports when a storm is approaching. It is also convenient to load goods directly onto an aircraft from a car or other vehicle.

An estimate of current air traffic activity from various sources is shown in the following table.

**Table 18: Comparison of estimates of current Naknek air traffic**

	<b>King Air</b>	<b>Penair</b>	<b>FAA 5010</b>	<b>FAA TAF</b>	<b>Y-K Plan</b>
Total Airport Operations	13,000	10,000	7,700	29,000	
Air Taxi	100	1,000	600	12,000	
GA Local	10,000	8,000	7,000	7,000	
GA Itinerant	2,900	1,000	100	10,000	
Character of Operations <sup>1</sup>					
A. School Transportation	3,500				
B. Bristol Bay Borough Business	3,500				
C. Fishing	1,500				
D. Itinerant Fueling/Maintenance/ Wind Protection	3,000				
E. South Naknek Resident Personal Business	1,000				
F. Other	500				
Enplanements					
Passenger <sup>2</sup>	9,380				10 <sup>4</sup>
Mail (tons)	0	0			
Freight (tons) <sup>3</sup>	10				200 <sup>5</sup>

**Notes:**

1. Derived from 1996 Pilot survey, 2003 community meetings, John King
2. 2,880 pupils + 6,500 (2 enplanements x ½ operations, except A, D.)
3. Derived from South Naknek's population less calculation of freight enplanement to King Salmon
4. Per person per year
5. Pounds per person per year

The Character of Operations shown in the above table can be broken into categories that relate to the type and main purpose of air travel. The categories can be described as follows:

- A. School Transportation: Includes daily air busing of students, and air transportation for teachers, school board members, and administrators. Also includes air transportation for students for Bristol Bay Borough-sponsored extracurricular activities such as sports and field trips.
- B. Bristol Bay Borough Business: All air transportation related to the construction, maintenance, and supply of public and private utilities and services.

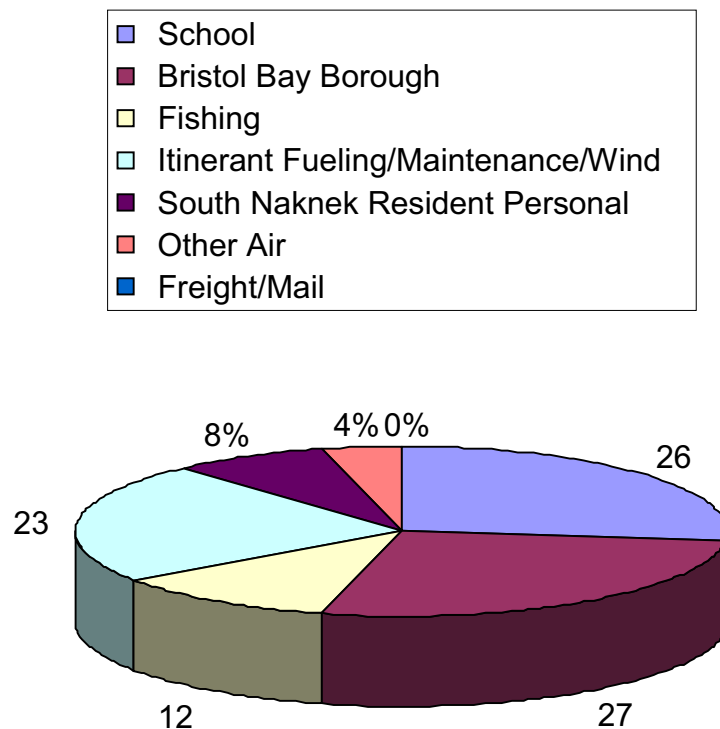
- C. Fishing: All transportation related to the supply of commercial fishing, whether a private or business enterprise. This includes equipment, supplies, and transportation of workers.
- D. Itinerant Fueling/Maintenance/Wind Protection: Aircraft owners taking advantage of the ease of access at the airport, and temporarily parking aircraft based elsewhere during storms.
- E. South Naknek Resident Personal Business: All air activity generated by South Naknek residents traveling for recreation, supplies, and/or visiting.
- F. Other: Includes all else: for example, scheduled or chartered air taxi service from towns outside the Bristol Bay Borough, such as Iliamna or Dillingham.

The following table compares the Master Plan and DOWL estimate for Naknek Airport, as well as the factors used for allocating types and character of operations:

**Table 19: Comparison of Master Plan and DOWL estimate**

	<b>Master Plan estimate (2002)</b>	<b>DOWL estimate</b>
Total Airport Operations	57,464	13,000
Air Taxi	575	100
GA Local	44,247	10,000
GA Itinerant	12,642	2,900
Based Aircraft	70	70
Character of Operations		
A. School Transportation	3,500	3,500
B. Bristol Bay Borough Business	19,967	3,500
C. Fishing	8,634	1,500
D. Itinerant Fueling/ Maintenance/Wind Protection	17,268	3,000
E. South Naknek Resident Personal Business	5,936	1,000
F. Other	2,698	500
Passenger Enplanements	6,241	9,380
Enplaned Mail	0	0
Enplaned Freight (tons)	10	10

Figure 4 shows the current characteristics of traffic at the Naknek airport.



**Figure 4: Current air traffic characteristics at Naknek Airport**

### ***South Naknek Airport***

Though the FAA Terminal Forecasts have not been updated for ten years, estimates of South Naknek operations are supported by air carrier reports filed by Penair. Penair estimates that they represent about 80 percent of all enplanements at the airport.

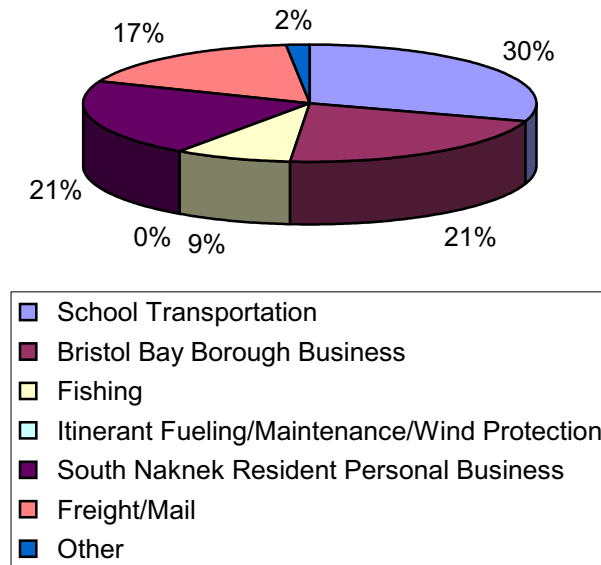
Penair operates three scheduled flights a day, for a total of about 2,200 annually, and King Air school-related transportation flights add another 3,500. There are 10 locally-based aircraft that represent about 1,000 flights a year. Various air taxis and private aircraft create about 5,000 operations per year for borough business, and for South Naknek residents' private business across the river in Naknek. South Naknek Airport is therefore estimated to have 11,700 operations per year, as shown in the following table. Figure 5 shows the Character of Operations in a chart.

**Table 20: 2001 South Naknek Airport air traffic characteristics estimates**

	<b>Current Estimates<sup>1</sup></b>
Total Airport Operations	11,700
Air Taxi	2,200
GA Local	1,000
GA Itinerant	8,500
Based Aircraft	10
Character of Operations	
A. School Transport	3,500
B. Bristol Bay Borough Business	2,500
C. Fishing	1,000
D. Itinerant Fueling/Maintenance/Wind Protection	0
E. South Naknek Resident Personal Business	2,500
F. Air Taxi/Freight Mail	2,000
G. Other	200
Enplanements	
Passenger <sup>2</sup>	8,200
Mail	1
Freight (tons)	2.23

Notes:

1. Derived from 2003 community meetings, King Air, Penair
2. 2880 pupils + 6500 (2 enplanements x ½ operations, except A, D)



**Figure 5. Current air traffic characteristics at South Naknek Airport**

### ***Floatplane Bases***

The Floatplane operating areas on the Naknek River adjacent to the King Salmon Airport and on Nornak Lake adjacent to the Naknek Airport also play a part in the Bristol Bay Borough's aviation system. Operations at Nornak Lake are estimated at 500 per year. Though there is one floatplane based there, the lake is primarily temporarily used for aircraft maintenance for Naknek River operators. Occasionally operators also shelter their aircraft there if extremely windy conditions are anticipated. The lake is depressed and surrounded by thick bushes.

Naknek River float operations have never been counted, though this is now underway as part of the Air Traffic Control Tower contract process. Preliminary estimates are about 10,000 operations per year. These operations are primarily visitor-related, providing access to fishing and hunting areas and lodges. Though not of interest as essential air service, tourism is forecast in several studies to increase in the area, which may be a benefit to the borough's economy in the future. Floatplane traffic is not expected to be affected by any scenario in this study.

### ***Forecast Development***

In developing aviation system forecasts for the region, some factors are important to consider:

- A dwindling state budget, in which the availability of maintenance funds is expected to decline
- State policy is being developed which would seek to eliminate duplication of services and facilities, especially in road-connected communities
- State policy for infrastructure development could be modified with changes in state administration (over 20 years)



- Difficulty in applying costs, benefits, and responsibility to other state agencies, which influence and are influenced by transportation projects (i.e., Department of Education)
- Budget shortfalls throughout the state realistically limit alternative sponsors for airports or any other facilities. However, the Bristol Bay Borough has requested information about assuming sponsorship of the Naknek airport from ADOT&PF
- FAA's commitment for funding safety improvements requires also that the sponsor maintain the facility for at least 20 years following the most recent grant, under their "Grants Assurances" policy. The State is obligated to maintain South Naknek Airport through 2016, and King Salmon Airport indefinitely. There is no obligation for Naknek Airport since no federal funds have been spent there yet.
- If an airport is closed, the unamortized portion of the FAA grant may have to be paid back to the FAA. In some cases, the FAA has considered using these funds to improve other airports in the airport system. Environmental reclamation, if necessary, may also have to be undertaken if the airport is closed or if there is a change in sponsorship.
- All airports must be safe for public operations
- Transportation changes unrelated to the proposed bridge may also influence future traffic patterns and capacity. Of note is the King Salmon control tower closure, and state pupil transportation policy
- Possibility of incentives for revenue-generating improvements such as tie-down rentals and other user fees, statewide
- Possibility that the U.S. Air Force could change maintenance and operations (M&O) funding in support of King Salmon airport
- Possibility of improved float plane base facilities

This section describes potential changes to the Borough's aviation system if a bridge is built across the Naknek River. The descriptions illustrate closures of some airports, and the resulting airport capital and operating cost savings.

Closure of an airport could also mean that another entity assumes sponsorship, control, and the cost of the airport improvements and maintenance, with the airport remaining open for public service. In all scenarios, King Salmon airport is kept open, maintained, and expanded according to plans already in place. Aviation considerations assumed in each scenario/option are shown in the following table.

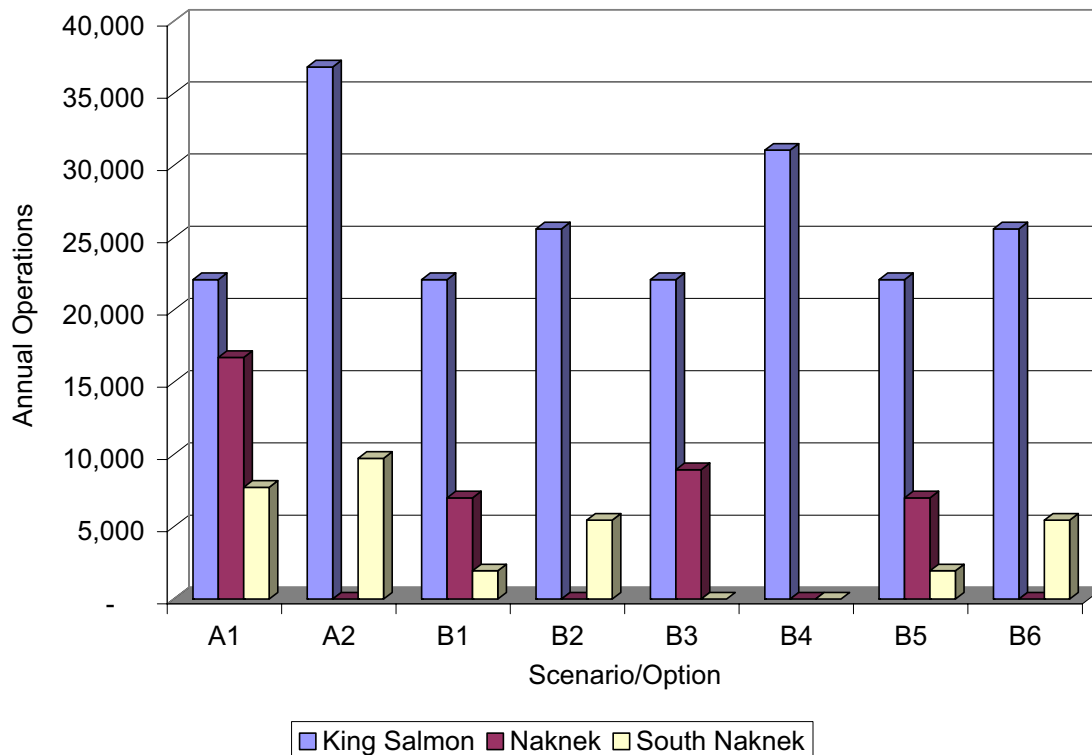
**Table 21: Aviation considerations in forecast development**

	<b>King Salmon Airport</b>	<b>Naknek Airport</b>	<b>South Naknek Airport</b>
Safety/Risk		Requires extensive development to meet minimum FAA and state safety standards.	
Improvement Costs	Requires capital improvements; increased maintenance.	Requires capital improvements; increased maintenance.	Requires capital improvements.
Convenience	15.5 mile road distance to Naknek, approximately 18-mile distance to South Naknek if bridge is built.	Located in the Borough's Population Center; unconstrained access to aircraft.	South Naknek relies on the airport for essential service; if it were closed, and a bridge were built, it could be an 18-mile trip to King Salmon Airport.
School Access	Airport is too far away from South Naknek to accommodate a fly/bus combination to school in Naknek.	Transportation of school children by air to Naknek is expensive and restricts school activities; with a bridge they could be bused.	Relies on airport for transportation of school children; with a bridge they could be bused.
Shift in Air Transportation Demand		Induced relocation of residents and businesses to King Salmon and South Naknek if the airport is closed and/or the bridge is built.	With a bridge, the community thinks that more residents would relocate to South Naknek, and business would be developed there.
Grant Obligations		Improvements to the Airport will trigger a 20-year grant assurance to FAA.	The Airport already has grant assurances to the FAA through 2016; if the airport were closed, this may have to be paid back.

	<b>King Salmon Airport</b>	<b>Naknek Airport</b>	<b>South Naknek Airport</b>
King Salmon Control Tower	A shift of more operations to that Airport would bolster sagging operations there, and may trigger FAA/state funding of the Tower.		
Timing		Naknek Airport will need to remain open and may need to be improved <i>before</i> a bridge is built if the school children continue to be flown over from South Naknek.	

### ***Aviation Forecasts***

The following figure shows forecasts of aviation activity (annual operations) in 2029 for each of the scenarios/options based on the considerations described above. Additional details on the operations and enplanements for years 2010, 2019, and 2020 are in Appendix F.



**Figure 6. Forecast of annual operations at area airports in 2029 by scenario/option**

## **Socioeconomics**

Construction and operation of any of the scenarios/options will change the transportation system in the Borough and influence the social and economic patterns in the community. The following paragraphs describe the potential changes in the economy and population under the aviation only (A) and with bridge (B) scenarios. Additional background information and detail on the information presented in this section can be found in Appendix C (community profile) and Appendix I (population and traffic projections).

### ***Population***

The population forecasts shown in Table 22 are predicated on changes in local economic conditions under the aviation only scenario (A). As discussed in Appendix C, the salmon industry is in a state of flux, and it is difficult to foresee precisely what the future will hold for the local seafood industry and residents (See for example, Knapp 2004 and CFEC 2004). As a result, low, base, and high scenarios were developed to assess the viability of a scenario/option and its potential impacts. In developing these scenarios the consultant team reviewed the reports cited above, statewide forecasts prepared by the Institute of Social and Economic Research at the University of Alaska Anchorage, the Alaska Department of Labor and Workforce Development, and studies prepared by Northern Economics on restructuring of the Bristol Bay salmon fishery, as well as other studies conducted by the firm in the region.

The base case population forecast anticipates continuation of long-term trends, and extrapolation of those trends is used to project the future population change. Similar extrapolations are used for the low and high cases. As noted in Appendix C, a substantial portion of the population loss in the Borough has been due to population declines in King Salmon, which has experienced significant population loss since the closure of the U.S. Air Force Base in 1994. At some point this population loss associated with the closure of the base will reach equilibrium, and the Borough economy will begin to respond more closely to changes in the salmon fishery. The current depressed status of the fishery, combined with anticipated restructuring of the salmon fishery, improving quality, and other factors suggest that the local economy could rise from its current levels, or at least maintain its current position, thus suggesting some stability or relatively minor changes in population levels over time for the base case.

The low case would see economic conditions deteriorate and the most negative population trends experienced over the past 13 years would be expected to continue. Conversely, the high case would see economic conditions improve and the population increase in response to those conditions. The turnabout in economic conditions is not expected to occur immediately, so the current trends of decreasing population in King Salmon and Naknek would, under these assumptions, continue until about 2010, the point at which economic conditions might have improved enough to encourage population growth. See Appendix I for additional detail on these scenarios.

**Table 22. Projected population by community under aviation only scenario**

Community	Year								
	2000	2001	2002	2010	2014	2019	2024	2029	2033
<b>Base Case</b>									
King Salmon	442	386	392	409	374	331	287	243	208
Naknek	678	663	642	722	749	784	819	853	881
South Naknek	137	124	121	117	109	100	91	82	74
Bristol Bay Borough	1,257	1,173	1,155	1,248	1,233	1,215	1,197	1,178	1,164
<b>Low Case</b>									
King Salmon	442	386	392	357	327	290	253	215	186
Naknek	678	663	642	653	652	652	651	651	651
South Naknek	137	124	121	106	96	83	70	57	46
Bristol Bay Borough	1,257	1,173	1,155	1,116	1,075	1,025	974	923	882
<b>High Case</b>									
King Salmon	442	386	392	370	393	423	456	491	521
Naknek	678	663	642	855	923	1,007	1,092	1,177	1,244
South Naknek	137	124	121	110	117	126	136	146	155
Bristol Bay Borough	1,257	1,173	1,155	1,336	1,433	1,557	1,684	1,814	1,921

Source: Population projections by Northern Economic, Inc.

Note: For comparison purposes, the ADOLWD projections cited in Appendix I estimated that the Bristol Bay Borough population in 2018, the last year of their projection, would be 1,734 under the middle case, 1,413 under the low case, and 2,668 under the high case. These estimates are much higher than those used in this report. ISER prepares statewide projections as well as projections for boroughs and census areas in the Railbelt, but projections for the Bristol Bay Borough were not identified.

The availability of a bridge would be expected to result in different economic conditions in the three communities, but particularly in South Naknek. The effect of the bridge on the communities is uncertain, so a range of outcomes is provided in this analysis using low, base, and high scenarios (See Appendix I for detail on the assumptions used in these scenarios).

Under the low case, it is assumed that the positive influence of the bridge is more than offset by the magnitude of adverse change in the regional economy. The decreasing population trends in South Naknek and King Salmon continue, and population levels are the same as projected in Table 22.

Under the base case, former residents of South Naknek who currently reside in Naknek because of proximity to their current jobs return to the community, and the lower transportation costs result in economic growth and additional jobs in South Naknek. The overall population levels in the Bristol Bay Borough under the base case remain the same as shown in Table 22, but there is a shift in future population growth with a greater portion of future growth occurring in South Naknek (See Table 23). This shift begins with construction of the bridge and continues after the bridge opens.

Under the high case, positive changes in regional economic growth result in population growth in all three communities, and additional employment in the region. The positive economic changes could be associated with restructuring of the salmon fishery, oil and gas development on the Alaska Peninsula, completion of the road to Chignik, or a combination of these and other changes. Former residents of South Naknek return to the community and a significant portion of persons migrating into the region for economic opportunity also settle in South Naknek.

**Table 23. Projected population by community under bridge and aviation scenario**

Community	Year								
	2000	2001	2002	2010	2014	2019	2024	2029	2033
<b>Base Case</b>									
King Salmon	442	386	392	409	374	331	287	243	208
Naknek	678	663	642	715	735	759	783	808	827
South Naknek	137	124	121	128	135	143	152	161	168
Bristol Bay Borough	1,257	1,173	1,155	1,253	1,244	1,233	1,222	1,212	1,203
<b>Low Case</b>									
King Salmon	442	386	392	357	327	290	253	215	186
Naknek	678	663	642	653	652	652	651	651	651
South Naknek	137	124	121	106	96	83	70	57	46
Bristol Bay Borough	1,257	1,173	1,155	1,116	1,075	1,025	974	923	882
<b>High Case</b>									
King Salmon	442	386	392	397	416	442	470	500	526
Naknek	678	663	642	855	923	1,007	1,092	1,177	1,244
South Naknek	137	124	121	138	165	199	232	264	290
Bristol Bay Borough	1,257	1,173	1,155	1,390	1,504	1,648	1,794	1,941	2,060

Source: Projections by Northern Economics, Inc.

### ***Economy***

A description of existing economic conditions in the region is provided in Appendix C. As noted previously, the uncertainty surrounding the Bristol Bay salmon fishery makes it difficult to forecast future economic conditions with precision, and a detailed analysis of the industry is beyond the scope of this study, so a scenario-based approach is used to depict the range of futures that might occur. Appendix I provides additional detail on the scenarios. The following paragraphs describe the potential changes in the economy under the aviation only (A) and under the bridge (B) scenarios.

The local economy would be affected by construction activities for any of the scenarios/options, and the resulting effects these expenditures and activities would have on local businesses. After construction is completed, the aviation only scenarios/options are not anticipated to influence the local economy in a manner that is substantially different from the present situation (See Appendix C). However, under the base case, population declines would continue at South Naknek and King Salmon. Closure of the Naknek airport would



shift aviation activity for wheeled planes to King Salmon, but no businesses are expected to close as a result (See Appendix I).

A road and bridge to South Naknek would eliminate the need for the air taxi service between South Naknek and the other two communities. King Air would lose a substantial portion of its current business, but the company does provide service to outlying villages, and this demand for air taxi service would continue even with a bridge in place.

During public meetings in South Naknek, residents stated that they order a substantial portion of their groceries and supplies via catalogs and mail order. According to the residents, the cost of ordering from Anchorage and shipping an item to South Naknek results in the item costing about the same as if they purchased it in Naknek or King Salmon. However, with the additional costs of flying back and forth to Naknek or King Salmon, the ultimate cost of buying locally is more expensive than ordering supplies from outside of the region. It is their opinion that a bridge would lower the costs of buying locally and were the bridge in place, they would purchase more groceries and supplies from local stores, thereby improving the regional economy. They also believe that a gas station, restaurant, and similar services would open or remain open year-round with bridge access.

In addition to the population-serving businesses cited above, local residents believe that a bridge would lower operating costs enough that one or more of the South Naknek processing plants would reopen. Given the state of flux that the seafood industry is in (See Appendix C) it is uncertain if this situation would occur. However, operating costs for a South Naknek plant would not be significantly different from a Naknek plant if a bridge were in place, so the possibility certainly does exist. It should be noted that economic trends are not continuous, but rather typically cyclical, and that future conditions could emerge that might see the South Naknek plants reopen. While a downward trend in the fishing industry has been in effect in recent years this trend could change with:

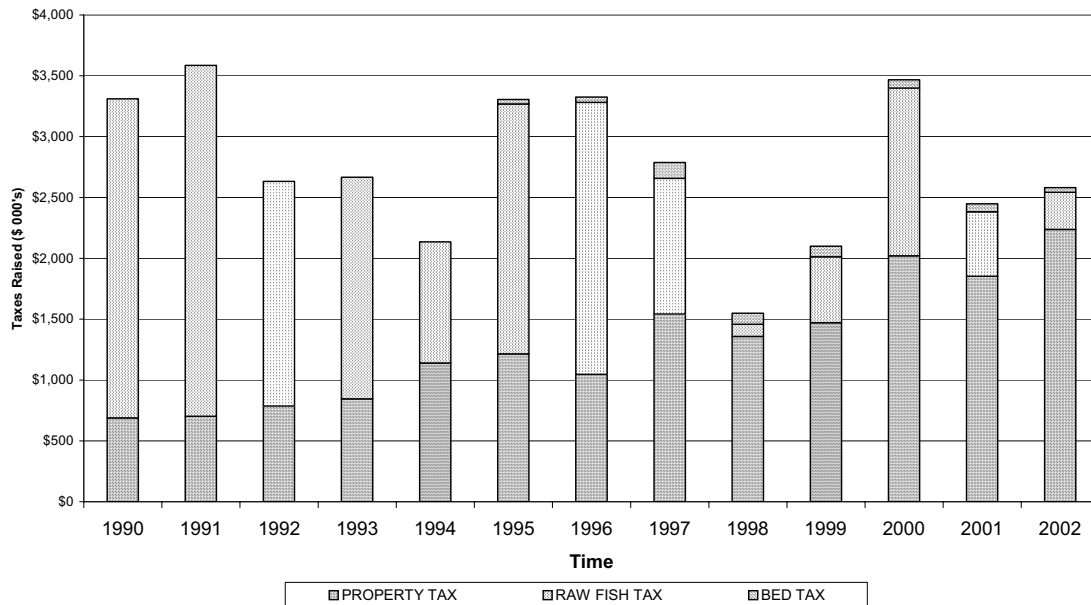
- A return to larger sockeye salmon harvests that existed in the recent past
- A change in public demand for wild salmon in response to health, safety, and sustainability issues surrounding the farmed fish industry
- A growing world population and continuing demand for foodstocks
- Changing foreign exchange rates that make imported farmed fish more expensive

Other events such as oil and gas development on the Alaska Peninsula could also result in improved economic conditions in the region. Most of the benefits to the Bristol Bay Borough and its communities would likely be associated with employment since previous studies conducted for the Minerals Management Service indicate that oil and gas activities would be centered around Port Moller, with the production being moved by pipeline across the Peninsula to deep water port sites on the Gulf of Alaska. The oil and gas industry is also expected to use the Cold Bay airport for exploration and production needs (U.S. Department of Interior, Minerals Management Service, 1985). The anticipated influence of conventional oil and gas development on the local economy is expected to be relatively small although potential development of local resources for coal bed methane could substantially reduce local energy costs.

### ***Fiscal Effects***

This section identifies local revenue sources and outside funding sources including grants to the Bristol Bay Borough. This information is drawn from three sources: the Consolidated Federal Funds Report for fiscal year 2002 put out by the U.S. Census Bureau, information on operating revenues and expenditures from the DCED web page, and from the Alaska Department of Tax Revenue. This section also provides an estimate of the potential savings that could accrue to the Borough and other local organizations with a bridge scenario.

Figure 7 shows the Borough's local tax revenues over the past twelve years. The variability of salmon runs — and hence the variable amount of fish tax revenue — means that the local tax revenue amount available to the Borough is also highly variable. Declining fish tax revenues have forced the Borough to raise property tax rates significantly in an effort to stabilize the Borough's budget. In 1990, property taxes represented 21 percent of total revenues. In 2002, they represented 85 percent of revenue. Additional detail on the Borough's revenues is presented in Appendix C.



**Figure 7. Bristol Bay Borough local tax revenues, 1990-2002**

Bristol Bay Borough has a 13.0 mills property tax (4.14 mills for schools and 8.86 for general services<sup>4</sup>), a three percent raw fish tax, and 10 percent accommodations tax during the months of May through October. Table 24 shows operating revenues from local and outside sources for the Borough. Approximately 49 percent of Bristol Bay Borough's operations revenue comes from outside sources. According to DCED, this amounts to \$7,868 per capita in revenue. Table 25 shows Borough expenditures. Expenditures per capita are \$6,859.

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<sup>4</sup> Bristol Bay Borough, Assembly Meeting Minutes, May 5, 2003.<http://www.theborough.com>.

**Table 24. Bristol Bay municipal revenues**

Revenue Source	Amount (\$)
Local Revenue	4,670,306
Local Tax Revenue	2,578,165
Service Charges	185,553
Enterprise Revenue	1,217,709
Other Local Revenue	688,879
Outside Revenue	4,448,783
Federal Operating Revenue	112,325
State Revenue Sharing	27,960
State Municipal Assistance	29,252
State Fish Tax Sharing	930,413
Other State Revenue	130,337
State and Federal Education Funding	3,218,496
<b>Total Operating Revenue</b>	<b>9,119,089</b>

Source: Rural Alaska Project Identification and Delivery System.

[http://www.dced.state.ak.us/dca/commdb/CF\\_RAPIDS.cfm](http://www.dced.state.ak.us/dca/commdb/CF_RAPIDS.cfm) accessed on April 9, 2004.

**Table 25. Bristol Bay Borough municipal expenditures**

Expenditure Category	Amount (\$)
General Government	826,206
Public Safety	695,565
Public Services No Education	2,526,330
Education Expenditures	3,653,345
Debt Retirement	247,919
<b>Total Operating Expenditures</b>	<b>7,949,365</b>

Source: Rural Alaska Project Identification and Delivery System.

[http://www.dced.state.ak.us/dca/commdb/CF\\_RAPIDS.cfm](http://www.dced.state.ak.us/dca/commdb/CF_RAPIDS.cfm) accessed on April 9, 2004.

In addition to these revenues and expenditures, the federal government provides other funds to the Bristol Bay Borough and organizations located or operating within the Borough. The Census Bureau categorizes federal spending using the following major “object” categories: retirement and disability, other direct payments, grants, procurement, and salaries and wages. Grants consist of grant payments (usually obligations incurred at the time the grant is awarded) to state and local governments and non-governmental recipients from all major

departments and agencies of the federal government. The grants are for a wide variety of programs and purposes, including Medicaid, highways and transit, education, food and nutrition services, community development, employment and training, energy assistance, environmental protection, low-income housing operations and rehabilitation, parks, airports, and other issues.

In most areas of the U.S., direct expenditures for retirement and disability payments for individuals, which includes fiscal year obligations for Social Security payments of all types, federal employee retirement and disability payments, veterans benefits, and other related federal expenditures, is usually by far the largest of the five federal spending categories. However, in the Bristol Bay Borough, federal expenditure for grants was five times larger than the expenditure for retirement and disability payments in fiscal year (FY) 2002 (Table 26). Approximately three-fourths of that grant money was for the Medical Assistance Program—\$15,138,756 of \$20,143,503 (See Appendix C).

**Table 26. Consolidated federal funds report, Bristol Bay Borough, FY2002**

<b>Summary Totals</b>	<b>FY 2002 Amount (\$)</b>
Direct Expenditures or Obligations	
Retirement/Disability Payments for Individuals	4,140,405
Other Direct Payments for Individuals	969,028
Direct Payments other than for Individuals	118,531
Grants (Block, Formula, Project, and Cooperative Agreements)	20,143,503
Procurement Contracts	4,019,847
Salaries and Wages	2,976,245
Total Direct Expenditures or Obligations	32,367,559
Exhibit	
Total Direct Expenditures or Obligations—Defense	3,359,000
Total Direct Expenditures or Obligations—Non Defense	29,008,559
Other Federal Assistance	
Guaranteed/Insured Loans	3,684,000

Source: U.S. Census Bureau, consolidated Federal Funds Report: Fiscal Year 2002, Detailed Federal Expenditure Data, accessed at <http://harvester.census.gov/cffr/asp/GeographyB.asp> on April 8, 2004.

As noted above, the largest federal grant in fiscal year 2002 was for about \$15 million, followed by \$1.5 million for highway planning and construction, and \$1.3 million for a state children's insurance program. All other federal expenditures were for less than \$1 million. Additional detail on specific grants awarded to the Bristol Bay Borough or other organizations in fiscal year 2002 is presented in Appendix C. Information on federal expenditures from 1992 through 2003 and planned expenditures for 2004 and 2005, is also presented in Appendix C.

The bridge scenario would allow for consolidation of facilities and services in the Borough, save travel costs for some agencies, and enable some social service programs to expand into South Naknek. Table 27 summarizes the potential savings if a bridge were built across the Naknek River. The total estimated consolidation savings associated with bridge construction are about \$476,000, based on estimates gathered for several organizations and government agencies. The largest savings would occur for the Bristol Bay School District and Bristol Bay Borough, which could save a combined total of approximately \$400,000, or about 5 percent of total local government expenditures.

**Table 27. Estimated Savings with a Bridge Scenario**

<b>Agency/Organization</b>	<b>Estimated Consolidation Savings</b>
Library	15,500
Borough, including Police and Fire Protection	100,000
Private Heating Fuel Savings	10,000
Post Office	10,000
Bristol Bay Borough School District	300,000
Family and Youth Services	320
BBNA Workforce Development	40,320
<b>Total</b>	<b>476,140</b>

Savings for the school district are mainly in the elimination of salaries associated with two teachers and three to four part-time jobs at the South Naknek school along with other operating cost savings. The school district would eliminate the \$128,000 annual cost of air transportation but increased busing costs of approximately \$75,000 to \$80,000 would offset some of these savings<sup>5</sup>. The school district will also be able to save capital expenditures by closing the current South Naknek school, and thereby avoiding the \$1.5 to \$2 million cost of a new school that would be needed in the near term if the present school were to continue in operation.<sup>6</sup> The school board has not yet considered where such savings might be employed elsewhere in the district, but these savings might be used to restore programs that have been cut, add new staff, or even provide materials and supplies.<sup>7</sup>

The Bristol Bay Borough provided a letter that documented potential cost reductions of about \$100,000 a year, depending on savings that are realized.<sup>8</sup> Some savings might be realized in salaries and expenses for the fire departments, and elimination of a part-time police officer in South Naknek during the summer months. However, a full-time police officer stationed in South Naknek might be required if the community's population increased to a level that required this additional position. This increased staffing would increase the overall cost for

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<sup>5</sup> Hebhardt, Richard. March 2004.

<sup>6</sup> Kumin, John. March 2004.

<sup>7</sup> Madsen, Cindy. November 2004.

<sup>8</sup> Alder, John, April 2004.

the police department. Closure of the South Naknek landfill could also result in additional savings, but this action has not been formally considered by the Borough Assembly.<sup>9</sup> Other benefits include reductions in fuel costs, vehicle purchases and maintenance, fuel transportation costs, electricity expenses, and travel expenses.<sup>10, 11, 12, 13</sup>

Other agencies and organizations are expected to realize cost savings as well. Bristol Bay Native Association's Workforce Development program expects to see annual savings of over \$40,000, almost all of which is based on the costs incurred by residents attending training courses.<sup>14, 15, 16</sup>

The library would realize savings of about \$15,500, which includes a librarian's salary and telephone expenses.<sup>17, 18</sup> The Post Office probably would not close, but it may realize some savings in transferring mail by truck rather than plane, an annual benefit estimated at about \$10,000.<sup>19,20</sup>

Residents of South Naknek would probably realize about \$10,000 in annual savings on their fuel expenses, due to the current high cost of transporting fuel across the river by landing craft or barge.<sup>21</sup>

Several social service programs such as "Meals on Wheels," and transportation services for the elderly that are provided by Bristol Bay Native Association are not available in South Naknek because of the high cost of travel.<sup>22</sup> The Alaska Division of Family and Youth Services is unable to have foster homes in South Naknek because the high cost of travel precludes the ability of the agency to monitor potential foster homes in the community. As a result, children are placed in foster homes in other communities, which makes it more difficult for the children. The absence of these programs in South Naknek imposes a cost on the potential recipients, but the cost is not readily monetized.<sup>23</sup>

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<sup>9</sup> Ibid

<sup>10</sup> Ibid

<sup>11</sup> Castleberry, Jerry. April 2004

<sup>12</sup> Bonnin, Betty. April 2004

<sup>13</sup> LaBrecque, Laurie. April 2004

<sup>14</sup> Freeland, Pat. April 2004

<sup>15</sup> Johnson, Ari. April 2004

<sup>16</sup> Reamy, Kathy. April 2004

<sup>17</sup> Elby, Anisha. March 2004

<sup>18</sup> Savo, Becky. March 2004

<sup>19</sup> Johnson, Tammy. March 2004

<sup>20</sup> Lochman, Bob. March 2004

<sup>21</sup> Ferrazzi, Tom. April 2004

<sup>22</sup> BBNA Elders' Services, April 2004

<sup>23</sup> Parrish, Julia. April 2004

### ***Land Use and Ownership***

Land uses near the King Salmon or South Naknek airports are not expected to change with the aviation-only scenario. Land uses near the Naknek airport would change with either option under the aviation-only scenario. Improvements at the Naknek airport would result in land acquisition in the vicinity to move and expand the airport, and mostly vacant land would be converted for airport-related uses. The airport expansion would be onto lands primarily owned by Paug-vik, Ltd., with subsurface rights owned by the Bristol Bay Native Corporation. Closure of the Naknek airport would result in land use changes, as the state would have little interest in continuing its lease with Paug-vik, Ltd. for the current airport. Paug-vik, Ltd. would have substantial incentives to have this land converted to other uses that maintain the revenue stream for the corporation. Closure of the airport may result in improvements at Nornak Lake, which could result in more floatplane operations. It is uncertain if this would be sufficient for these businesses to remain in operation or if they would move to King Salmon.

Land uses on the north side of the Naknek River near the proposed road and bridge corridor are primarily privately owned, low density residential, with some boat storage and related facilities on some of these properties. On the south side of the river, the proposed alignment crosses mostly Alaska Peninsula Corporation lands, although there are privately owned Native allotments near the proposed bridge. Most of this land is vacant and used for subsistence and recreation. Closer to the community of South Naknek, privately owned residential lots are the primary use. Some additional lands in South Naknek may see residential construction if the population of the community increases. Other than that change, construction of a bridge and road will have limited effect on changing land uses on either side of the river in the 20-year study period.

## **Natural Environment**

The natural environment includes the components of the physical environment such as geology, soils, and hydrology, and the biological environment, which includes vegetation, wetlands, wildlife, and fish. Environmental considerations described in this section are common for major infrastructure projects and the procedures are normal for projects in the State of Alaska and the region.

The following paragraphs provide a brief synopsis of items that will need to be addressed in any future environmental studies. Usually, an Environmental Assessment is conducted, and if potential impacts are determined not to be significant, a Finding of No Significant Impact would be issued. If environmental impacts are identified with the potential to be significant, an Environmental Impact Statement would be prepared.

Issues that may arise during the environmental permitting phase would likely include impacts on land use, the economy, air and water quality, wetlands, wildlife and migratory waterfowl, floodplains, coastal zone, Threatened or Endangered Species, fish and fish habitat, historic and archeological resources, and construction impacts.

Geology and soils would need to be studied for bridge and road construction, both from engineering and environmental aspects. Sediment deposition from road or bridge construction would be a major concern. Bridge design and construction methods would need

to be coordinated with resource agencies to ensure fish habitat is protected. Additional material sites would need to be found for transportation improvements at South Naknek.

Road construction may disrupt surface water hydrology, so design and construction would need to maintain natural drainage patterns in wetlands, and ensure storm water drainage prevents sedimentation and contamination of surface water. Further study will be required to determine whether dewatering or inundation of habitat are potential impacts of the project. Another area of concern is whether changes in surface water hydrology will compromise soil stability of the road, and/or its underlying substrate, or cause degradation of permafrost elsewhere in the project area.

The effects that a bridge would have on the Naknek River would need to be analyzed. The hydrology of the Naknek River would need to be evaluated to ensure that a bridge and roads are located and designed to avoid the potential for future actions that may adversely affect water quality. For example, the bridge location or design may eventually cause riverbank erosion, requiring riprap reinforcement; the bridge may need alterations to protect the abutments or piles from scour or ice movement; and dredging may be needed if sediment is being deposited. Ice, tidal influences, navigation channels, and/or fish and wildlife migration may affect or be affected by a bridge.

Water quality of surface water bodies, including the Naknek River, will need to be evaluated. Runoff from the bridge deck will need to be evaluated to prevent storm water runoff from the bridge deck reaching the water. Potential sources of pollution, such as oil from vehicles, construction-related fuel storage and equipment fueling, de-icing compounds, and dust palliatives and their probable impacts need to be identified.

The Naknek River area is located in a discontinuous permafrost zone. All structures and roads must be designed and built in a way that prevents or avoids subsidence from melting permafrost.

The construction phase of the project would introduce additional air pollutants into the area. These may be attributed to operation of heavy equipment exhaust and particulates. Dust from material mining, hauling, and placement would need to be examined. Further investigation will be needed regarding the levels of airborne particulates and whether an additional gravel road will add to air quality problems.

Wetlands dominate the region, and wetlands will need to be filled to construct a road, or for any airport or road improvements. Complete wetland avoidance is not possible. Wetlands in the project area will need to be mapped to quantify the types and amounts that could potentially be impacted under different development scenarios/options. The analysis should also determine whether development in wetlands potentially creates any significant impacts to surface water hydrology or fish and wildlife habitat in the project area. Sedimentation from disturbed soils will need to be investigated.

Marine mammal species that are known to occur in Bristol Bay are whales (beluga, gray, and Orca), harbor porpoise, walrus, northern fur seal, harbor seal, Steller sea lion, and sea otter. Beluga whales are known to follow smelt when they migrate up the Naknek River.

Endangered and threatened species of Alaska include: Aleutian shield fern, short-tailed albatross, spectacled eider, Steller's eider, Eskimo curlew, Steller sea lion, humpback whale, right whale, blue whale, and bowhead whale. Of these, the spectacled and Steller's eider are



known to occur in the area. Essential Fish Habitat (EFH) occurs along the Naknek River and its tributaries.

Consultation with the United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) for the Naknek and King Salmon Airport Master Plans (ADOT&PF, 2001a and 2001b) indicated that the airport projects would not likely affect any threatened or endangered species or their habitat. Consultation with the USFWS and NMFS will be required throughout the design and construction phases. Potential adverse impacts on EFH and threatened species would need to be examined and mitigated. Timing restrictions for construction will likely be identified, as well as methods to reduce or avoid potential adverse impacts.

The undeveloped lands on the south side of the Naknek River are used for subsistence hunting and gathering. A bridge and road would provide increased access to subsistence areas. The majority of the land surrounding South Naknek is owned by the local Native Corporation, the Alaska Peninsula Corporation. The general public currently needs permission to enter corporate lands. During the detailed study phase of the project, an assessment of subsistence resource impacts due to increased access would need to be conducted. Additional restrictions or enforcement activities may be necessary to maintain adequate subsistence resources.

The Naknek area was first settled more than 6,000 years ago by Yup'ik Eskimo and Athabascan Indians. The area has historically been used for fish camps, hunting, and trapping. Cultural Resources Surveys have been conducted for the airports. During the detailed study phase, a Cultural Resources Survey would need to be conducted for road and bridge routes.

The U.S. Department of Transportation Section 4(f) lands are publicly owned lands in public parks, recreation areas, wildlife and waterfowl refuges, and historic sites. Taking Section 4(f) lands is not permitted by U.S. Department of Transportation projects unless there is no prudent and feasible alternative to the use of land from the property, and the proposed action includes all possible planning to minimize harm to the property resulting from such use. Most of the land surrounding Naknek, King Salmon, and South Naknek is local Native corporation land (Paug-Vik, Inc. and Alaska Peninsula Corporation), Bristol Bay Borough, municipal lands, private land, and Native allotments. Publicly owned parklands and recreational areas are not sited in the Naknek area. To ensure avoidance of 4(f) lands, land status and land use designations would need to be confirmed before siting a bridge or road routes.

Aircraft noise is reduced when an airport closes, while an increase in vehicular noise would be expected in an area where a new road is built. Reductions and increases in noise due to any proposed action would need to be considered during a more detailed study. The effects of noise during construction of a bridge at any location over the Naknek River would need to be examined. Noise effects due to road or airport construction would need to be evaluated.



## How do the Scenarios/options compare?

### Capital and operating costs

This section provides several comparisons of the scenarios and options. The first comparison is based on estimated capital and annual operating costs for the scenario/options, using each of the aviation only alternatives as the basis for comparison (See Table 28 and Table 29). The tables show the change from the amounts of capital and operating costs that are associated with the comparison option.

**Table 28. Estimated Capital and annual operating costs: A1 Comparison**

Scenario/Option	Annual Operating Costs (Thousands of 2003\$)					Capital Costs (Millions of 2003\$)	
	Borough	School	Other	ADOT&PF	Total	Low	High
		District	Organizations				
A1	0	0	0	0	0	0	0
A2	0	0	0	-30	-30	-19	-19
B1	-100	-300	-76	45	-431	26	40
B2	-100	-300	-76	17	-459	7	21
B3	-100	-300	-76	25	-451	22	35
B4	-100	-300	-76	-5	-481	3	16
B5	-50	-300	-76	-5	-431	26	40
B6	-78	-300	-76	-5	-459	7	21

Note: See discussion entitled “What Changes are Being Considered and What Would They Cost?” and notes to Table 1 for additional clarification of information presented in this table.

**Table 29. Estimated capital and annual operating costs: A2 comparison**

Scenario/Option	Annual Operating Costs (Thousands of 2003\$)					Capital Costs (Millions of 2003\$)	
	Borough	School District	Other Organizations	ADOT&PF	Total	Low	High
A1	0	0	0	30	30	19	19
A2	0	0	0	0	0	0	0
B1	-100	-300	-76	75	-401	45	58
B2	-100	-300	-76	47	-429	26	40
B3	-100	-300	-76	55	-421	41	54
B4	-100	-300	-76	25	-451	22	35
B5	-50	-300	-76	25	-401	45	58
B6	-78	-300	-76	25	-429	26	40

In addition to the operating and capital cost information presented for each scenario/option above, this study used three other approaches to compare the various scenarios and options. These approaches included:

- Evaluation criteria
- Benefit-cost analysis
- Survey of Borough residents

The results of each of these approaches are summarized in the following subsections. Details on each approach are presented in the appendices in this report.

## Summary of rankings for other approaches

Table 30 summarizes the information on rankings for each scenario/option from the three different approaches. The information is ranked from best (1) to worst (8). Additional detail on the ranking for each approach is presented in the following subsections.

**Table 30. Comparison of rankings by scenario/options**

Scenario/options	Evaluation Criteria	Benefit- Cost Analysis	Subtotal	Resident Survey	Bridge Total
A1. All airports open	7	8	15		
A2. Close Naknek	8	7	15		
B1 All airports open	6	5	11	1	12
B2 Close Naknek	1	2	3	4	7
B3 Close South Naknek	3	4	7	2	9
B4 Close both airports	1	1	2	6	8
B5 Borough operates both	5	5	10	3	13
B6 Borough operates S. Naknek	4	2	6	5	11

By design the resident survey was developed to assess the level of support for a bridge and did not ask questions about the aviation only alternatives. Therefore, the subtotal column presents the rankings for each scenario/option under the evaluation criteria and benefit-cost analysis, while the Bridge total incorporates both of those approaches plus the ranking from the resident survey.

A comparison of the results of the various evaluation methods indicates that a bridge scenario is preferred and consistently ranks above the aviation only scenario. Option B2 has the lowest score and highest ranking but it would not meet the Department's objectives of cost sharing and reducing operating costs. Option B4 would have the next highest ranking but it would not have public support because it would close both general aviation airports. Option B3 would have public support because Naknek airport would remain open, and it would achieve reduced operating costs for the Department, but the Department's cost sharing objective is not met. Option B6 seems to be the next best option for consideration. This option would provide a general aviation airport as preferred by Borough residents and one that the Borough could operate without the potential problems that might be encountered at Naknek in its current condition. This option would also meet the Department's objectives of reducing operating costs and cost sharing.

The following subsections provide additional detail on the evaluation methods.

## Evaluation criteria

The evaluation criteria presented here came from comments at the public meetings conducted by the project team, correspondence from local residents, and the goals and objectives of the Department in undertaking this study as identified in the Request for Proposals, and in public presentations. The criteria and associated measures for evaluating each scenario/option are presented below.

Which scenario/option:

- Results in the lowest total annual maintenance costs for ADOT&PF?
  - Measure: Net present value of maintenance costs for airport and bridge alternatives over the 20-year study period
- Has the lowest capital cost?
  - Measure: Net present value of capital costs, including replacement and major refurbishment costs, over the 20-year project study period
- Results in the greatest improvements in safety for school children and other travelers?
  - Measure: Qualitative assessment of South Naknek parents' and air taxi pilots' perceptions of safety
- Results in improved educational and social benefits for school-age children?
  - Measure: Number of times students arrive late for school or cannot return home under each alternative
  - Measure: Perception of socialization benefits of attending a larger school by South Naknek teachers and parents
- Has the largest effect on reducing costs and generating savings (if any) for other government agencies, local businesses, and residents of the Borough?
  - Measure: Changes in capital (including replacement and refurbishment costs) and operating and maintenance costs over the 20-year project study period for each alternative for each major entity and an aggregate estimate for all South Naknek households.
- Improves access to hospitals and clinics for residents of South Naknek?
  - Measure: Discussion of reductions in emergency response time and travel time from South Naknek to Naknek, and medical evacuations to Anchorage.
- Will generate the most economic activity in the Bristol Bay Borough?
  - Measure: Net number of businesses (gains and losses) or business expansions anticipated with each alternative (including effect on air taxi services)
  - Measure: Number of seasonal and permanent jobs created or lost, by community
  - Measure: Net tax revenue generated in Bristol Bay Borough
- Has the largest net benefits?
  - Measure: Net benefits identified in the benefit-cost analysis
- Has the largest benefit to outlying villages?
  - Measure: Provides easiest access to subregional center businesses and facilities in the Bristol Bay Borough
- Provides the greatest net benefit to general aviation, including floatplanes, operating in the study area?
  - Measure: Number of aircraft parking spaces available
  - Measure: Reduction in occurrences of wind damage anticipated with each alternative
  - Measure: Qualitative assessment of improved operational safety at remaining airports under each alternative as perceived by pilots and control tower personnel
- Improves access for emergency services vehicles and staff throughout the Borough?
  - Measure: Qualitative assessment of improved access for vehicles and staff

Table 31 summarizes the results of applying the evaluation criteria to the scenario/options. The scenario/options are ranked using a scale of one to five. Since there are seven unique scenario/options, some receive the same ranking. Under the scoring system used in this table, a lower score indicates a better scenario/option. A score of 1 indicates that a scenario/option is a better choice than the other options, although ties are possible. A score of 5 indicates that a particular scenario/option does not provide as many benefits as other options, or that it has an adverse effect. A score of 3 suggests that the scenario/option provides fewer benefits than some options but more than others, or if there is an adverse effect, that the effect is less than some and more than other options.

**Table 31. Evaluation criteria summary`**

Criteria	Aviation Only			With Bridge			
	All Open	Naknek Closed	Naknek Closed	S. Naknek Closed	Both Closed	Borough Operates	
						Both	S. Naknek
Perceived Safety	4	5	1	1	1	1	1
Education/social benefits	4	5	1	1	1	1	1
Health care access	4	5	2	1	3	1	2
Emergency service access	4	5	1	1	1	1	1
Economic development	4	5	1	1	1	3	2
Net benefits	5	4	2	3	1	3	2
Benefits to outlying villages	2	5	3	2	4	1	3
Lowest maintenance cost	2	1	3	4	2	5	3
Lowest capital cost	2	1	3	4	3	5	3
Reduces cost for others	4	5	1	1	1	3	2
Total Ranking	35	41	18	19	18	24	20

Note: Lowest numeric value represents scenario/option with most positive aspects

## Benefit-cost analysis

A benefit-cost analysis was prepared to evaluate the various scenario/options (See Table 32). In benefit-cost analysis, the scenario/options are compared to a selected case. In this analysis, scenario/option A1 is the comparison standard, so that scenario/option has zero benefits or costs. Benefit-cost analysis also evaluates a project from the perspective of a broader society or in this case, at the national level. Therefore, even though the state will save money if the Borough operates and maintains one or more airports, the Borough will incur similar costs so there is no difference between scenario/options B1 and B5, or between B2 and B6. In a

similar manner, a person who loses their job because of consolidation will surely feel a loss of income and consider this a cost. However, for society, the cost savings resulting from the elimination of a job presents an opportunity to use or reinvest those dollars in another activity that can provide greater benefits since the job is now redundant.

The estimates shown in Table 32 employ the base case population forecast (See Appendix I) and the high bridge cost estimate (See Appendix E for other cost estimates). A lower bridge cost or higher population growth increase the net benefits for the options associated with the bridge scenario. Additional detail on the benefit-cost analysis is presented in Appendix G.

**Table 32. Benefit-cost summary with base case population and high bridge cost**

Option	Travel Cost Benefits or Costs		Consolidation Savings	Net Operating Cost Savings	Total Incremental Capital Costs	Net Benefits
	Existing Trips	Induced Trips				
(Net Present Value, Millions of 2003 \$)						
A1. All Airports Open	0	0	0	0	0	0
A2. Close Naknek	(7.10)	-	-	0.40	(14.60)	7.90
B1. All Airports Open	7.14	168.11	4.39	(0.03)	24.47	150.76
B2. Close Naknek	2.55	168.11	4.39	0.37	9.89	161.14
B3. Close South Naknek	6.03	168.11	4.39	0.16	20.92	153.39
B4. Close Naknek and South Naknek	1.44	168.11	4.39	0.59	6.51	163.63
B5. Borough Operates Both	7.14	168.11	4.39	(0.03)	24.47	150.76
B6. Borough Operates South Naknek	2.55	168.11	4.39	0.37	9.89	161.14

Note: Travel cost benefits or costs include costs for passengers and pilots whose planes are diverted from their preferred airport to another airport when their preferred airport is closed. These costs are included under the existing trips column.

Option B4 has the highest net benefits for the bridge scenario; however, all of the bridge options offer significant net economic gains. The benefits for B4 are so large that the benefits associated with induced trips for any of the bridge options could be reduced to less than 10 percent of the estimated levels shown in Table 32 and the net benefits would still be larger than A2. Induced benefits for the other bridge options could be reduced substantially and they would still provide larger net benefits than A2. Under the high bridge cost and low



population forecast the bridge options still have greater net benefits than A2 (See Appendix G).

There are two types of benefits shown in the table. These include travel cost or user benefits, and consolidation savings to the Borough, local residents, and other organizations. The consolidation savings should not be added to the travel cost benefits because, as described below, the savings are already captured in the value of the induced trips. (See Appendix G for more details.) Costs include the net operating costs and capital costs in relationship to scenario/option A1. The difference between the sum of the benefits and the costs equals the net benefits.

Direct standard of living and productivity gains to persons making river crossings are called “user benefits” to distinguish them from other more indirect benefits, such as economic development, that may accrue to persons who may not cross the river at all, or to the community or region as a whole. The primary user benefits of the construction of a bridge spanning the Naknek River at Fishery Point will arise in two principal categories. The first category includes those existing travelers who currently make river crossings via the various modes currently available: air taxi, private plane, skiff or other boat, snow machine and “other vehicles,” which includes cars and trucks making the crossing when the river freezes sufficiently to support the vehicle’s weight. Time savings and reduction in out-of-pocket travel costs benefit existing travelers as a result of the quicker and less expensive means of travel provided by the bridge.

Benefits in the second principal category arise in the form of additional trip-making to and from South Naknek and neighboring areas by auto and truck users for whom the costs of access prior to the improvement outweighed the value of opportunities on the other side. Such opportunities can include existing draws such as shops, work places, and social and recreational activities. As well, new opportunities can emerge in response to the new cost-to-value travel equation, leading to yet further “induced demand.” Together, the reduction in time savings, and operating costs, plus the value of new trips account for the vast majority of benefits associated with transportation projects.

Although the economic benefits of improved access to South Naknek are measured here in terms of the monetary equivalent value of the time and operating costs to be saved by users of a prospective bridge, and the value derived from new trips, the final economic manifestation of such benefits could arise partly in other forms. These other benefits could include stimulation of commercial and housing development on both sides of the river, increases in the value of land, addition of jobs from businesses whose transportation costs are significantly lower, costs savings to the Bristol Bay Borough from consolidation of services currently duplicated in both Naknek and South Naknek and so on. Estimates of the latter benefits have been made and are shown in Table 32 alongside the total travel cost benefits, because these benefits are, in effect, already included in the value of the induced trips. In fact, the increase in the number of trips resulting from the bridge is in part due to residents traveling across the river to procure services such as education, library, and clinic, which would no longer need to be provided on both sides of the river.

It is simply analytic convenience that leads transportation economists to measure the development value of better access through the lens of trip volumes, including new demand, and corresponding time savings. We know something of the trip-generating effects of a new

bridge in a particular geographic circumstance. The alternative, namely to forecast the monetization of each acre of land development because of improved access, requires a great deal more information and, more significantly, is a great deal less accurate.

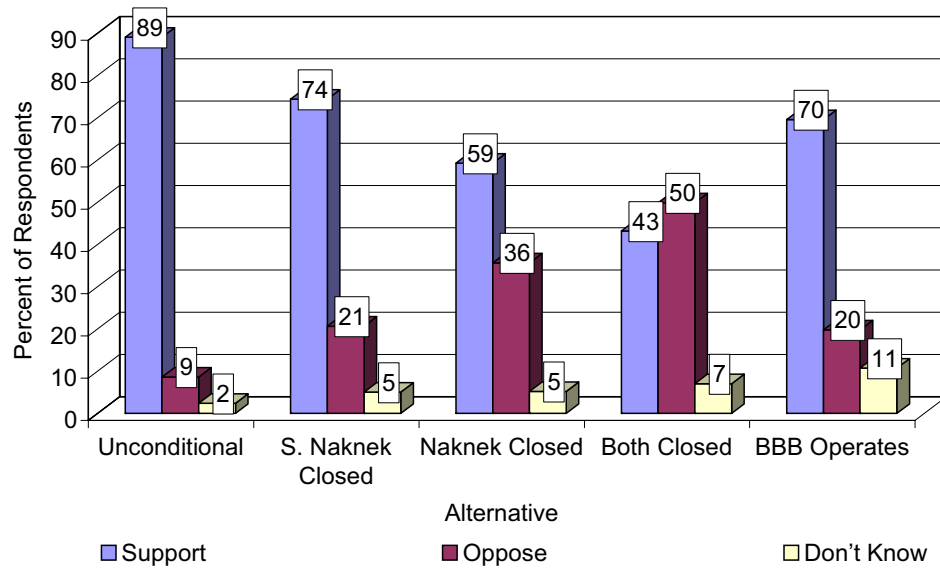
## **Survey**

As a result of public meetings held in the Borough in October 2003, the Department decided to conduct a survey of Borough residents to determine their support for the bridge and the various options, and to assess current travel patterns. Between January 2 and January 5, 2004, 172 households in King Salmon and Naknek were surveyed by telephone. Respondents were selected through a combination of random-digit-dial methodology and an Internet phone directory number search. Thirty-five households out of 36 households in the community responded to a survey distributed by the South Naknek Tribal Council in February, 2004. The travel pattern information was presented in Why is a bridge being considered?. This section summarizes the information on residents' support for the various scenario/options.

Respondents were asked if they support or oppose the construction of a bridge over the Naknek River under the following conditions:

- 1) Unconditionally
- 2) If South Naknek Airport was closed
- 3) If Naknek Airport was closed
- 4) If both South Naknek and Naknek Airports were closed
- 5) If both airports remained open but Bristol Bay Borough provided maintenance and operation costs (respondents were provided an estimate of this amount)

Figure 8 presents the analysis from both surveys. Local residents generally support the bridge, with lesser support if individual airports are closed or the Bristol Bay Borough operates the airports. Only when both airports are closed does public support fall below 50 percent.



**Figure 8. Borough resident opinions on bridge and selected options**

Additional information on the survey is presented in Appendix J.



## How might the future transportation system be managed and financed?

This section describes potential financing and funding alternatives for construction and maintenance of the Naknek bridge and connector roads. It also discusses the funding options — or lack of funding options — for community operation and maintenance of the airports in South Naknek and/or Naknek. Additional background information and detail on transportation funding programs is provided in Appendix H.

ADOT&PF prepares a list of needed transportation projects across the state in three-year increments. The current State Transportation Improvement Plan (STIP) is for 2004 through 2006. ADOT&PF also maintains an up-to-date online project database of the Needs List.

The Needs List contains all the projects that state residents, elected officials, and transportation officials have formally proposed; however, the content of the list is constrained by the estimate of available funding and is limited to those projects for which there is reasonable expectation of funding (ADOT&PF, 1999). ADOT&PF retains the selection authority for NHS and AHS projects because of the statewide importance of these projects. In addition, projects may be advanced or delayed to take advantage of specific funding categories (ADOT&PF, 2003).

The proposed Naknek River crossing is not included in the STIP but it was identified in the Southwest Area Plan as a potential project. If built, the Naknek River crossing project would be selected and funded at the discretion of the ADOT&PF Commissioner since the project would be part of the Alaska Peninsula Highway and, therefore, part of the AHS. It is anticipated that if a decision to proceed with construction of the crossing project is made, that the bridge might open to traffic six to eight years after the decision.

Improvements for the aviation-only scenario, with the exception of wind protection, have been identified in airport improvement plans. The initial improvements at King Salmon are anticipated to start in federal fiscal year 2006 under either scenario. (Additional detail on the proposed improvements and the schedule for implementation is presented in Appendix F.) Improvements identified in the airport improvement plans for Naknek and South Naknek airports are presently deferred until this report is complete. If a decision is made to proceed with the improvements at one or both of the airports, the airport projects would need to be placed into the programming process where they would be re-evaluated and ranked with other airport improvements projects around the state. Depending on the ranking of the projects and policy goals, the capital projects at Naknek and South Naknek could possibly be funded in 2006, 2007, or later years.

Operations and maintenance funds for the three airports and the existing highway are provided by the state with airport leases providing some of the funds necessary for maintenance and operations at the airports.

Funding for construction of the bridge and road would come from the Federal Highway Trust Fund through the Federal Highway Administration (FHWA). The State of Alaska would need to provide matching funds for the project. As noted in What changes are being considered and what would they cost?, the cost for the bridge and road is estimated at \$26 million to \$40 million in 2003 dollars but under the bridge scenario, the State would not

make the \$22 million (in 2003 dollars) investment in the Naknek airport over the next 20 years. The bridge and road would be part of the Alaska Highway System, and it is anticipated that the state would maintain those facilities.

Scenario/options B5 and B6 would reduce the Department's annual maintenance costs of roughly \$50,000 at the Naknek (\$30,000) and South Naknek (\$20,000) airports (See Capital and operating costs). The reduction in annual maintenance costs under these scenario/options could offset at least part of the estimated maintenance costs of \$45,000 for the proposed bridge and road extension. Under these scenario/options, the Bristol Bay Borough would accept the annual obligation for maintenance of the South Naknek and possibly the Naknek airport. Part of this maintenance cost could be offset by leasing revenues and/or tie-down fees at the South Naknek airport, but this revenue stream has not been estimated since it is uncertain if the Borough would implement such lease requirements or fees.

Total expenditures by the Borough could increase or decrease, depending on policy decisions yet to be made regarding consolidation of facilities and services, as described above and in Fiscal Effects. However, if the savings to the Bristol Bay Borough School District of approximately \$300,000 were included, taxpayers in the Borough could benefit from potential reductions in total expenditures of about \$400,000. This would more than offset the additional expenditures that the Borough might incur for maintaining the South Naknek airport.

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